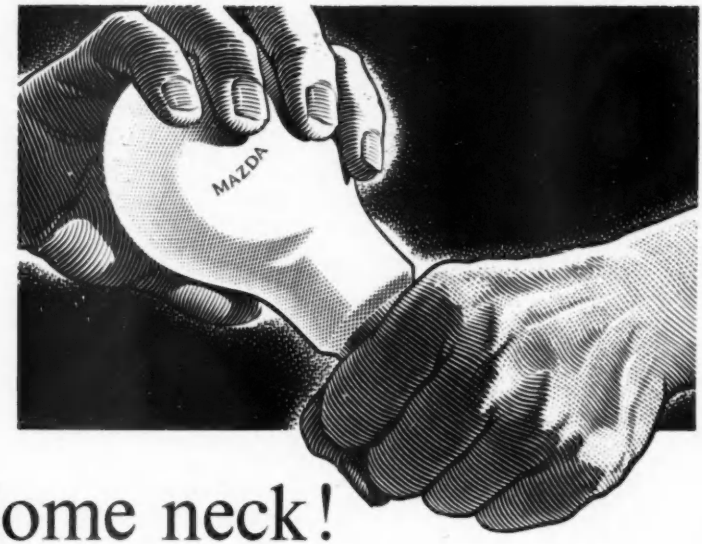
ELECTRICAL TIMES

THURSDAY
26 MAR.
1953
NINEPENCE



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The cap of a Mazda lamp can withstand a twisting strain of well over 25lb. in.

The secret of this great strength lies in the neck of the glass bulb which has moulded ridges. These form a key for the specially blended heat and damp resisting cement which locks the neck to the cap.

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Mazda *lamps stay brighter longer*

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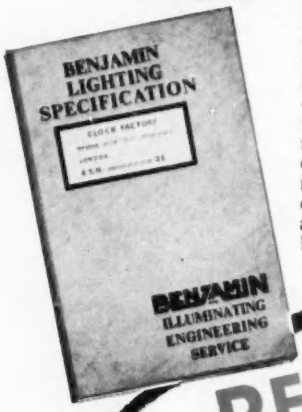

Good Lighting doesn't just " happen." It is the result of right planning, following an expert survey which takes every item into account—the layout of the plant, the type of work being carried out and the seeing conditions of the operatives. The Benjamin Illuminating Engineering Service does all this and then submits a specification, complete with drawings and explanatory details, so that you can know exactly what is required. This Service is entirely without cost or obligation to you, of course, and is immediately available wherever you are situated. Why not contact Benjamin now!

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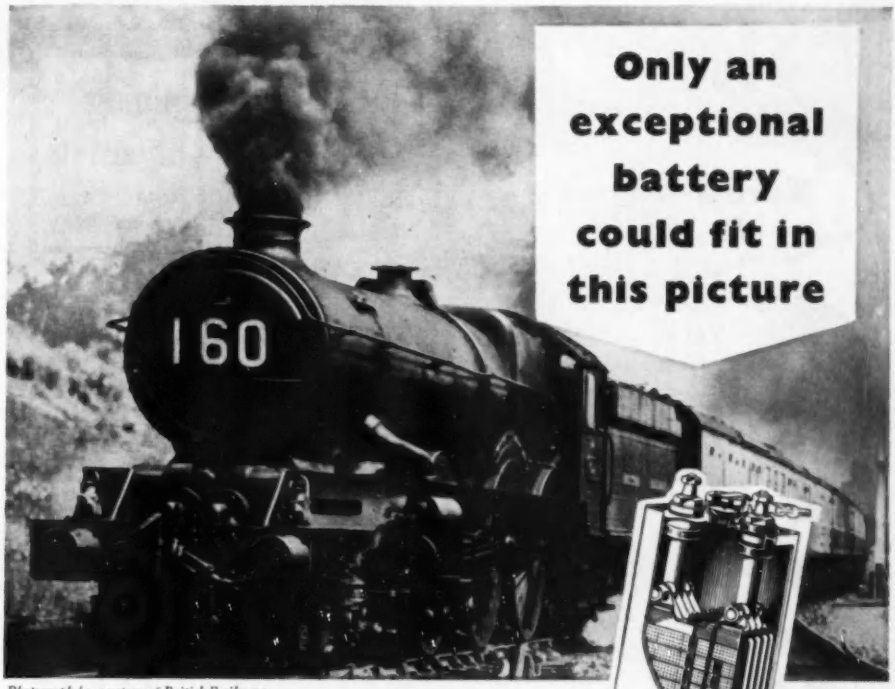

Only an exceptional battery could fit in this picture

Photograph by courtesy of British Railways

When an express train is thundering down the rails, on schedule to the minute, every part of the locomotive is being put to a gruelling test. The batteries which travel on these giants—no less than any other part of the engine — have to be good to take the hours-long pounding every trip entails.

Eighteen years ago, the G.W.R. chose Nife steel batteries to ride on their locomotives, acting as watchdogs of safe rail travel, and British Railways' Western Region have seen no reason to change. Little wonder, since some of the original batteries are still in use after giving 17 and 18 years of trouble-free service! Today 4,500 Nife batteries provide the operative power for the Region's automatic train control system.

Nife Batteries can take it

Except when the brakes are on, Nife batteries are under a small but continuous load and subjected to constant vibration and shock. Nife batteries stand up to rough usage because they're made of steel — case and plates—and have great mechanical strength. They cost little to maintain and give maximum energy in a minimum space.

Exceptional ruggedness and dependability make Nife batteries in demand for all railway needs; signal controls and point machines, communications, lighting and control circuits on electric trains, electric locomotive control batteries, sub-station switchgear control and protection, and platform trucks. In fact, you'll find Nife Batteries doing the toughest jobs, the world over.

- *Costs less to maintain*
- *Indestructible steel case*
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NIFA

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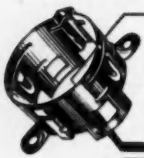

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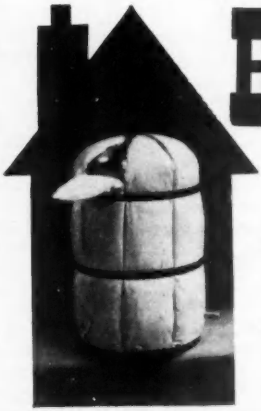

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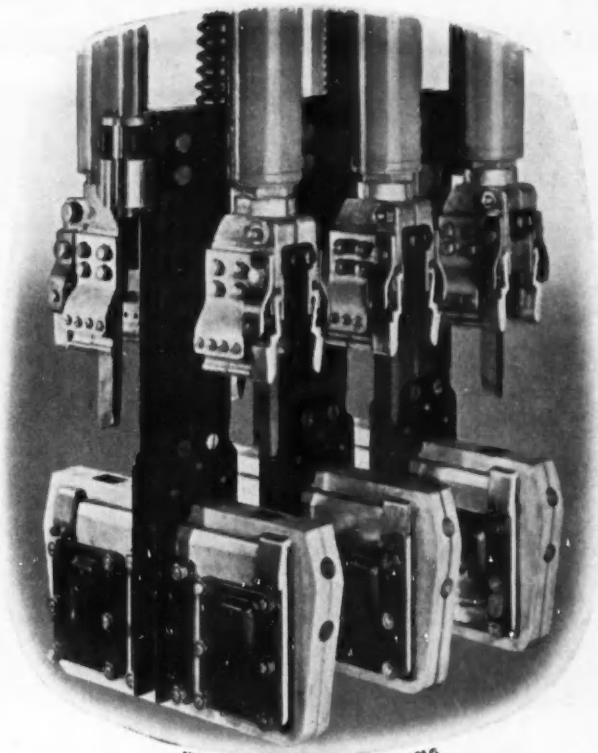

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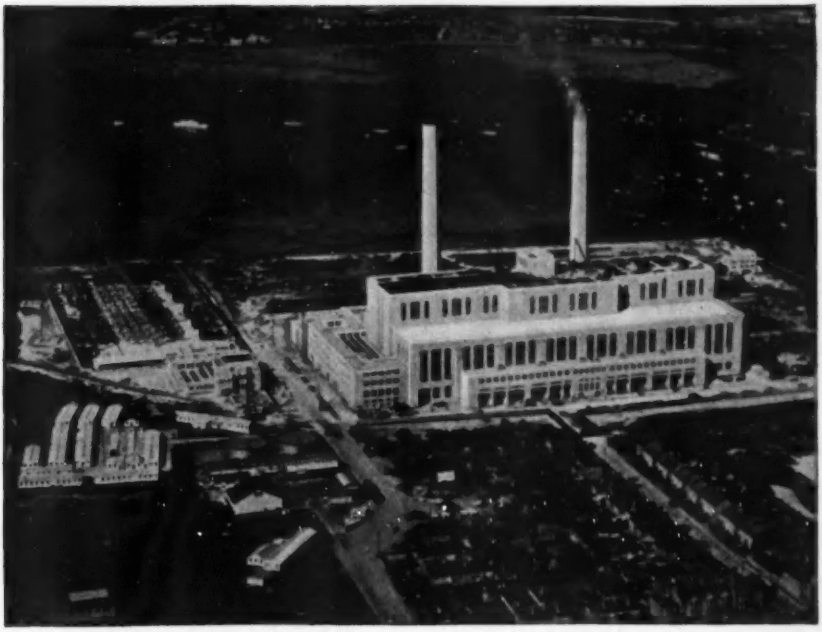

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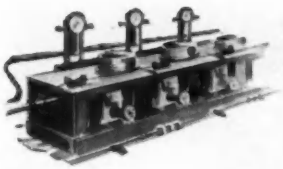

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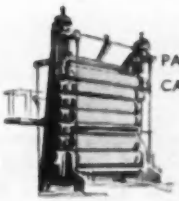

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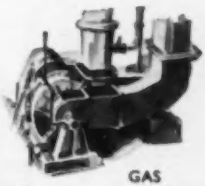

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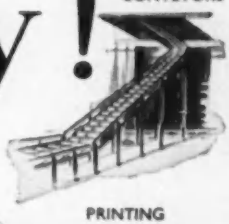

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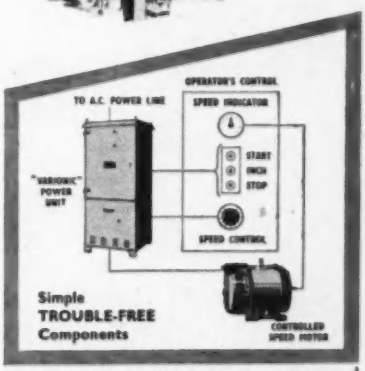

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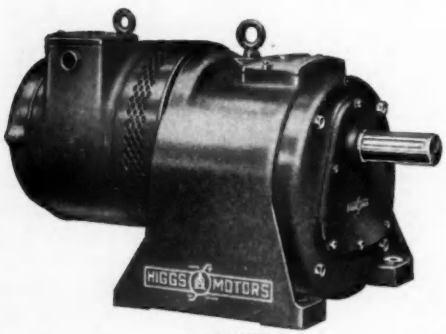

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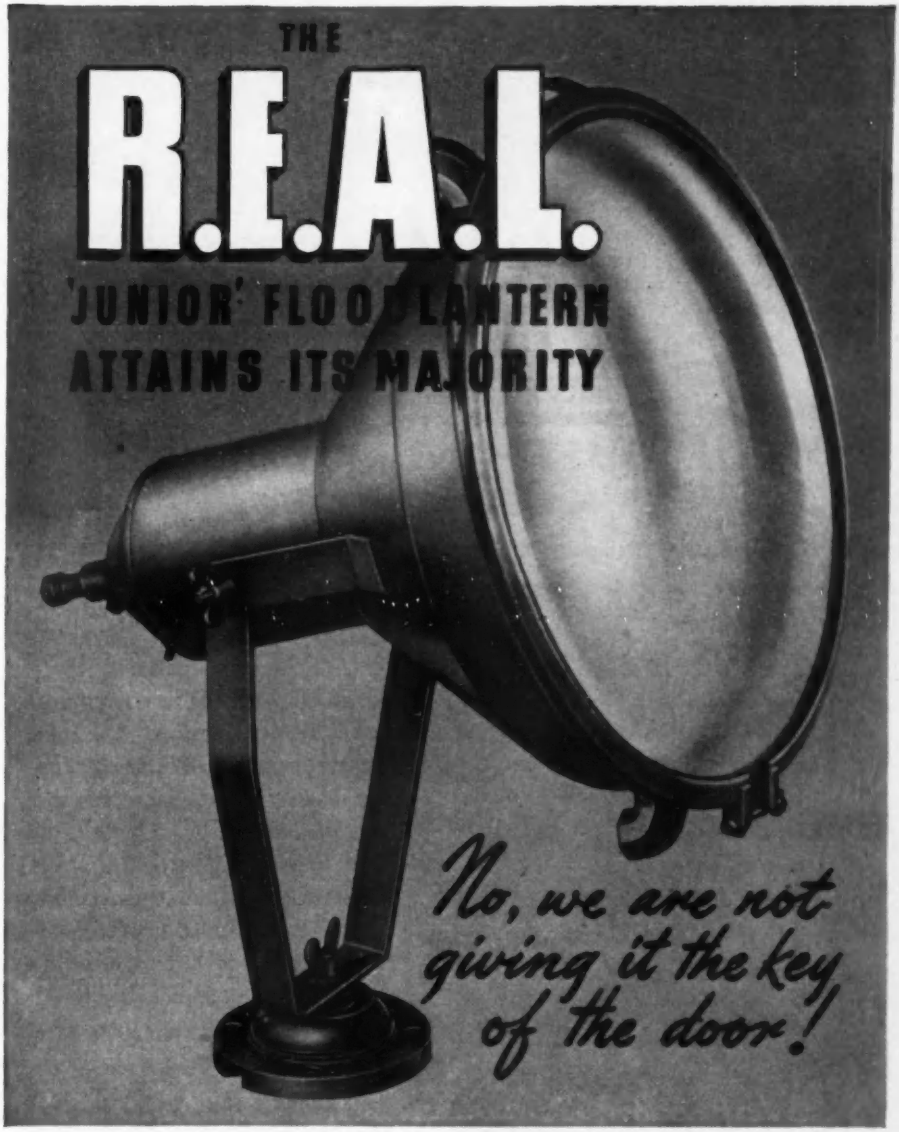

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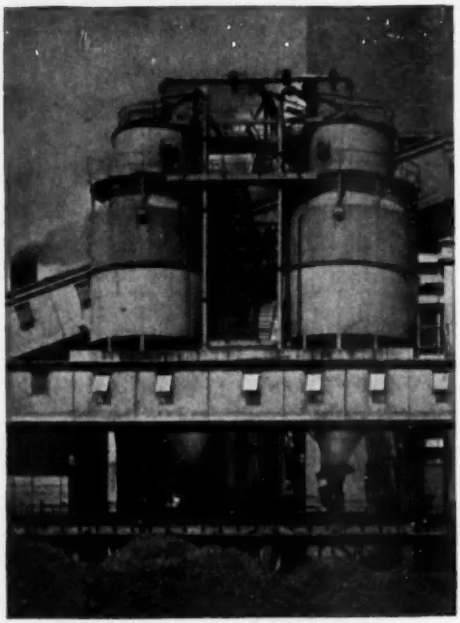

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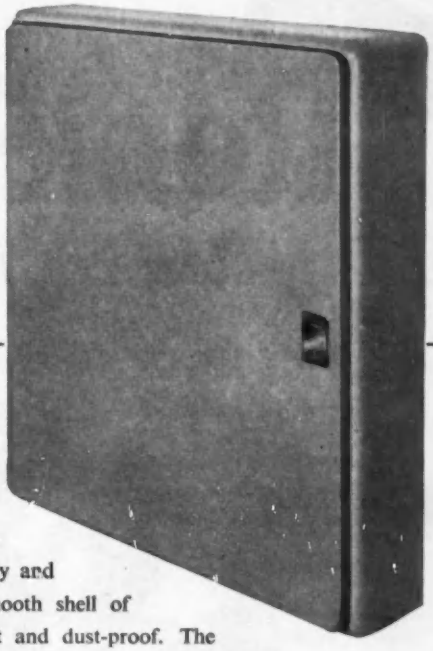

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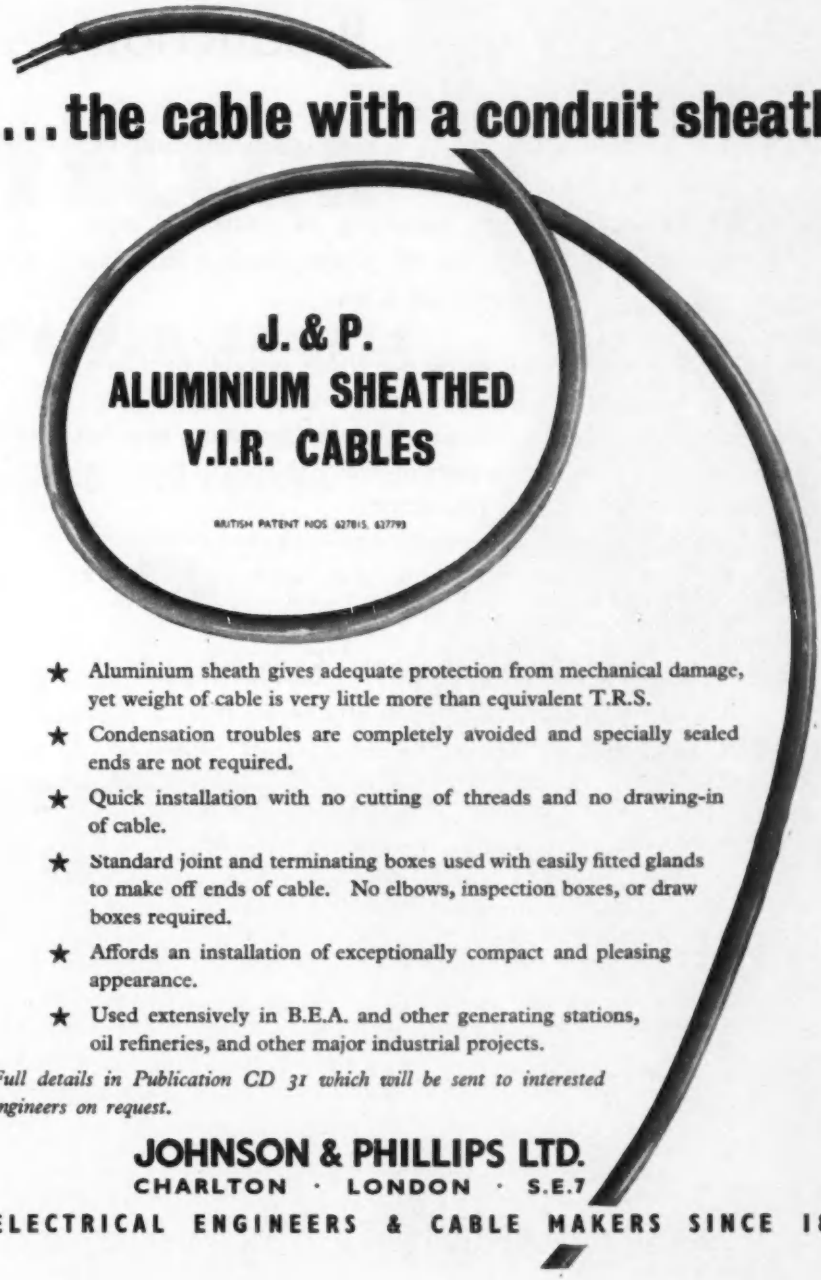

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★ Affords an installation of exceptionally compact and pleasing appearance.

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Electricity is a valuable commodity — far too valuable to waste. For more production, use more power more efficiently.

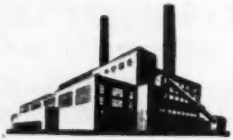
Electrical Engineers' Exhibition

EARLS COURT, MARCH 25—28, 1953

The British Electricity Authority stand, number 77, features the plans and progress made in connection with construction of the 275 kV Supergrid.

For the interest and information of both technical and lay visitors to the exhibition, arrangements have been made for organised parties to visit the two nearest British Electricity power stations, Battersea and Fulham. These visits will take place on the last three days of the exhibition, March 26, 27 and 28, each party comprising a maximum of twenty persons. Should requests for visits be in excess of the numbers that can be dealt with during the period of the exhibition, further parties will be arranged on the three days following its closure, March 30 and 31 and April 1.

Tickets for, and further information about, these visits may be obtained from the Enquiry Kiosk on the Authority's stand, where general information concerning British Electricity will also be available. For telephone enquiries, the Kiosk number is FULham 1125.



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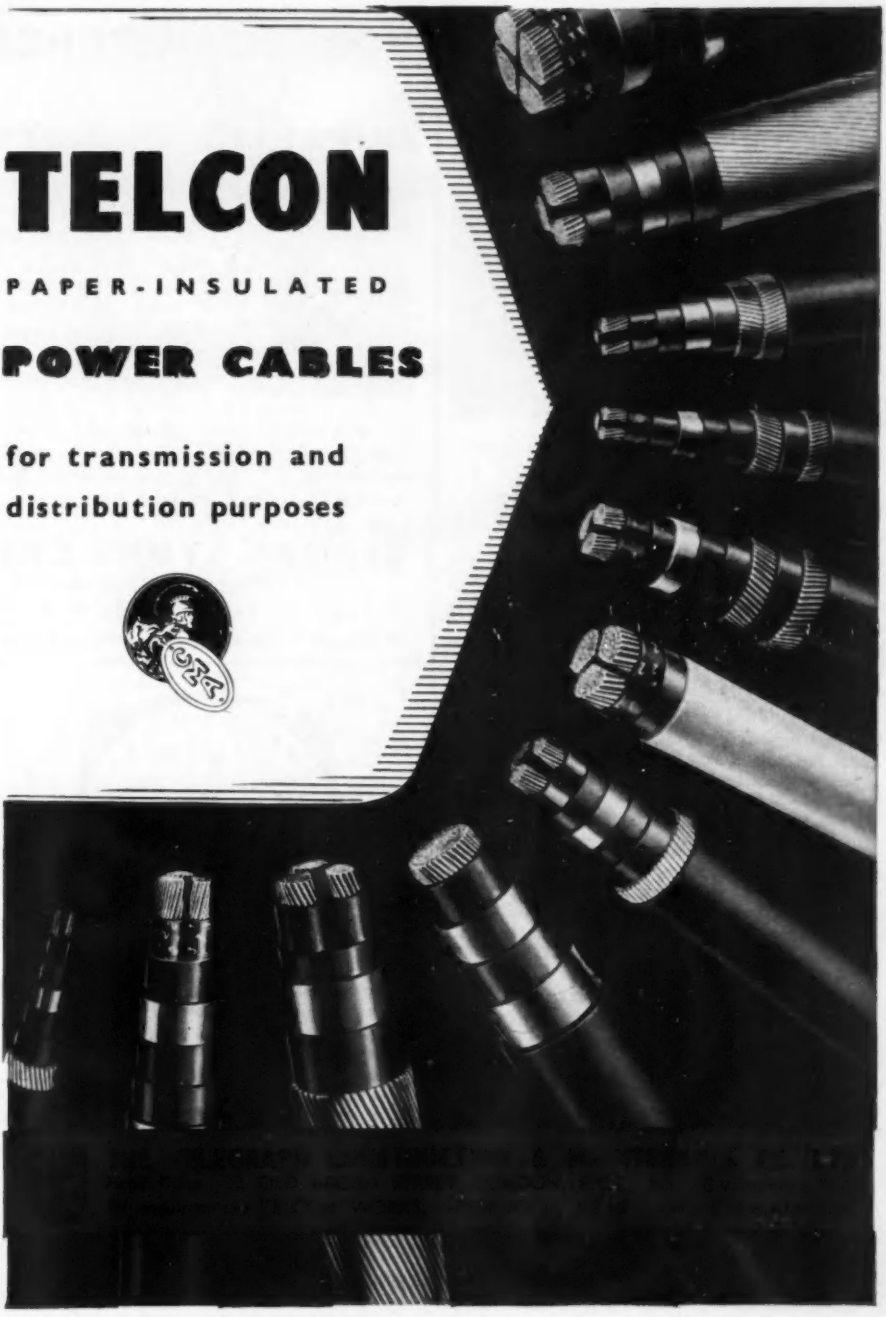

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This "BEST" COFFEE PERCOLATOR has a 2½-pint capacity, almost instant percolation, a special "keep hot" device and an automatic safety cut-out for the heater. Elegant in design and of superb craftsmanship in heavy gauge copper, it is finished in polished chrome. Loading 500 watts—A.C. only, 100/120, 200/220 and 230/250 volts.

"BEST" FANFARE KETTLE

Nominal capacity 4 pints. The "BEST" Fanfare Kettle has new Musical Alarm, and is fitted with connector-ejector safety device element. Chromium finish on hard copper. Loading 1500 watts, for 100/110, 200/220, 230/250 volts A.C./D.C.

"BEST" ELECTRIC JUGS

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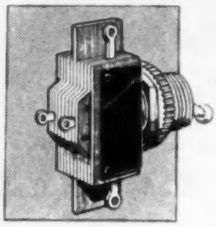

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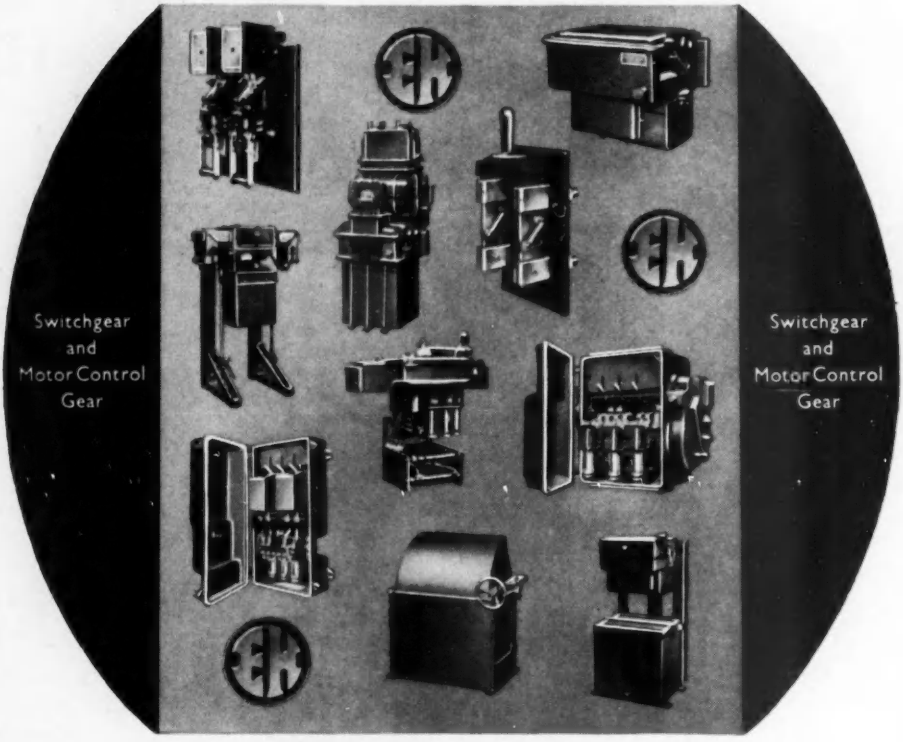

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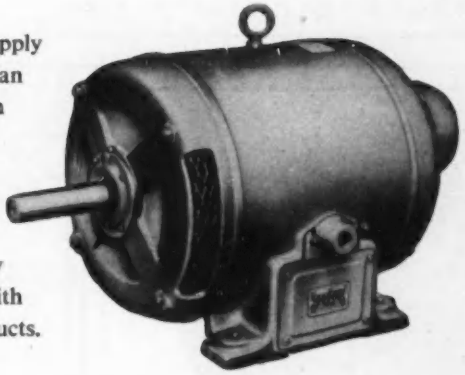

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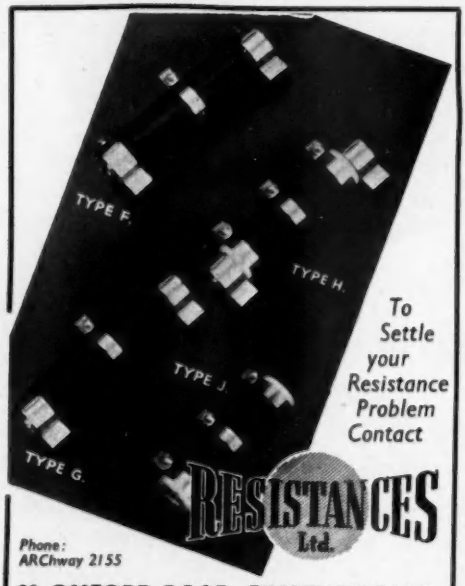

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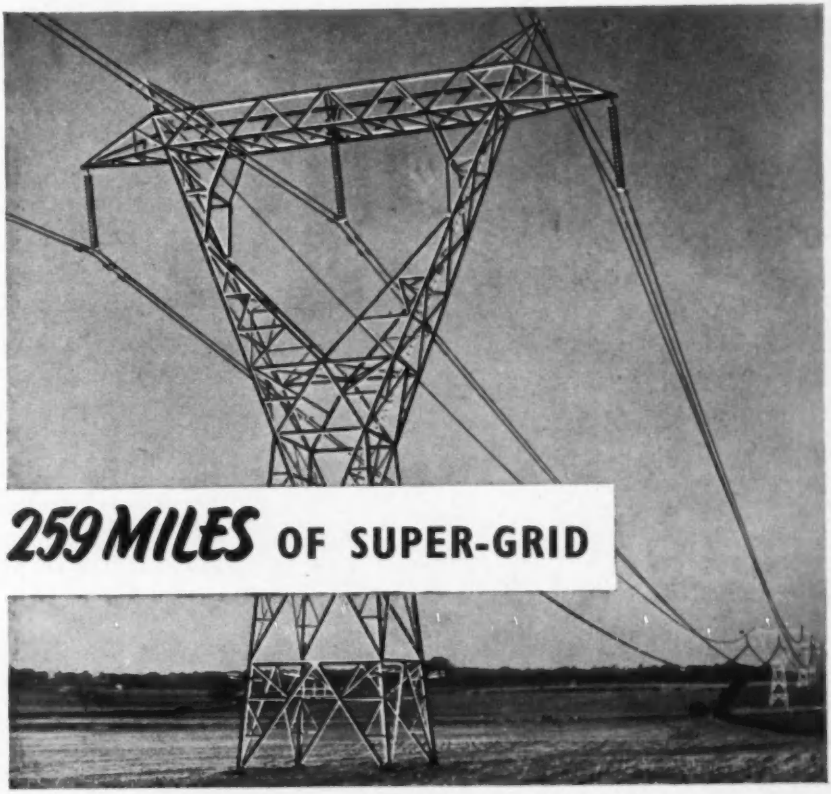

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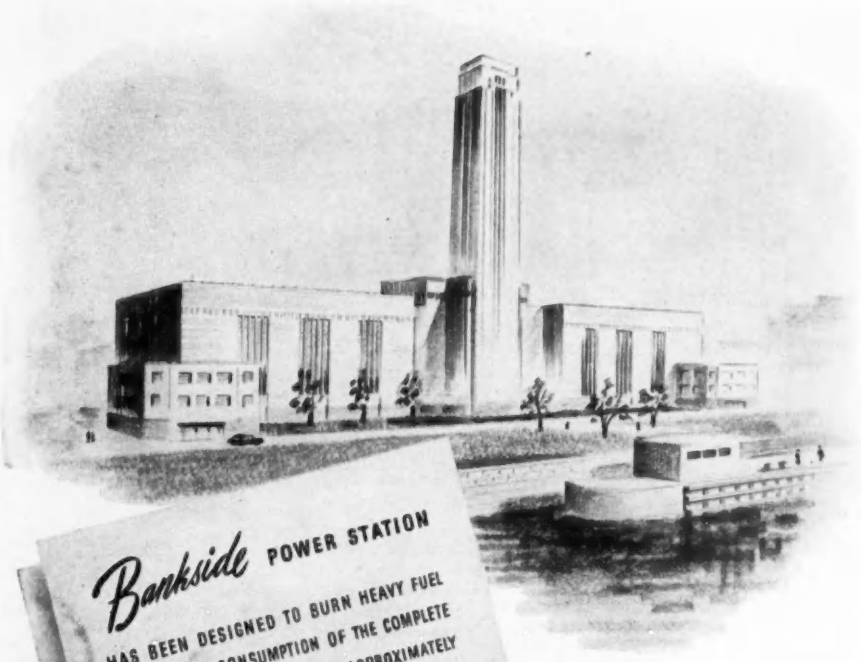

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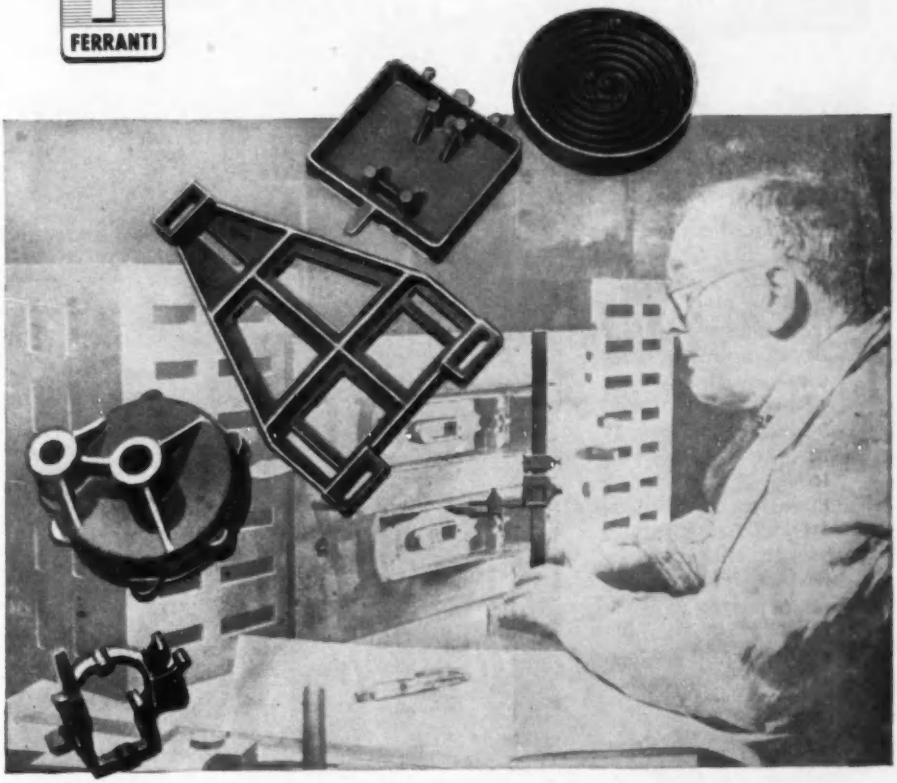

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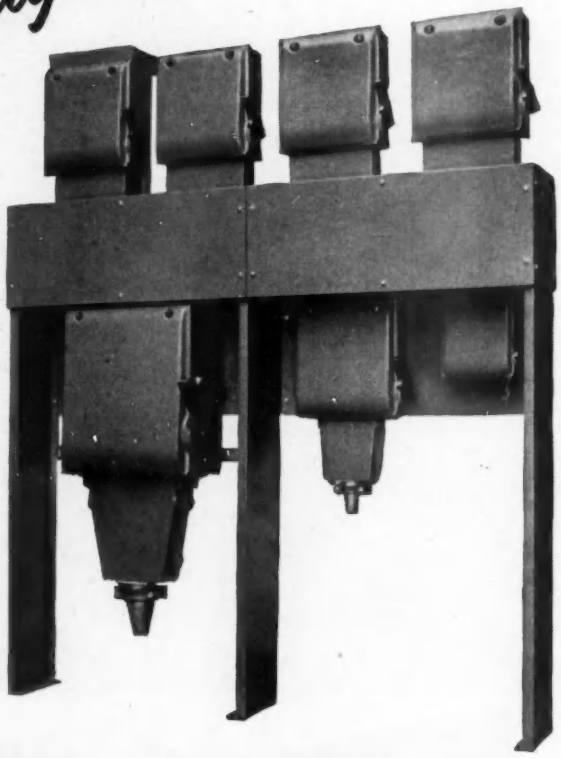

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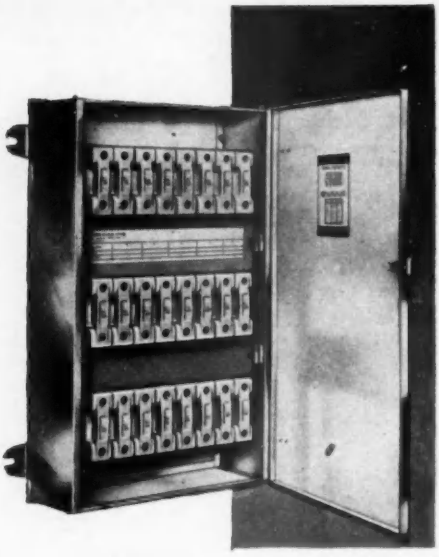

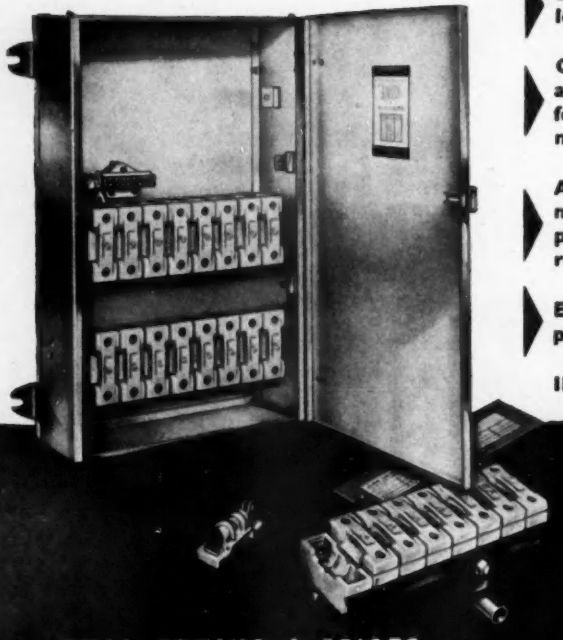

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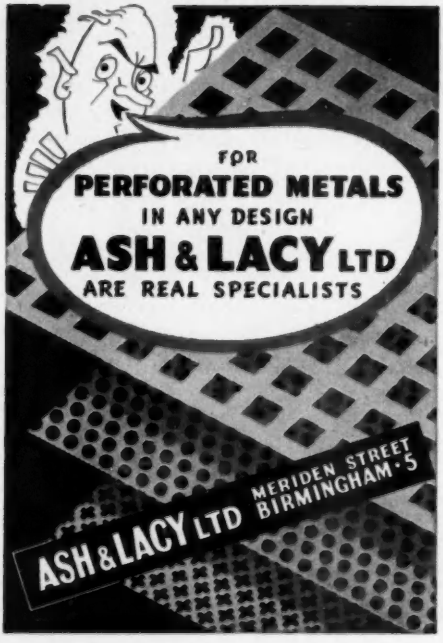

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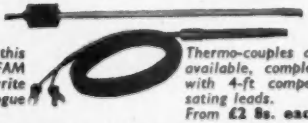

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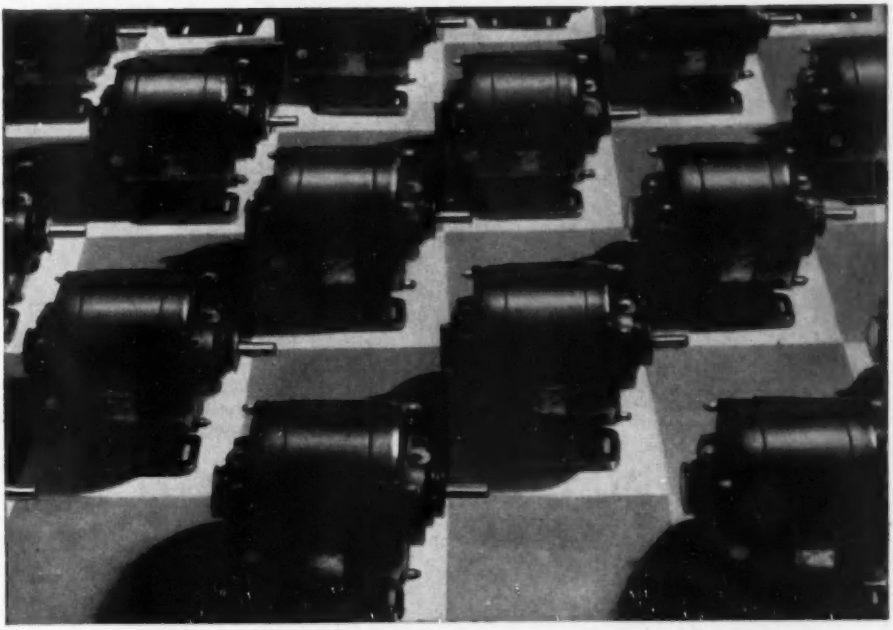

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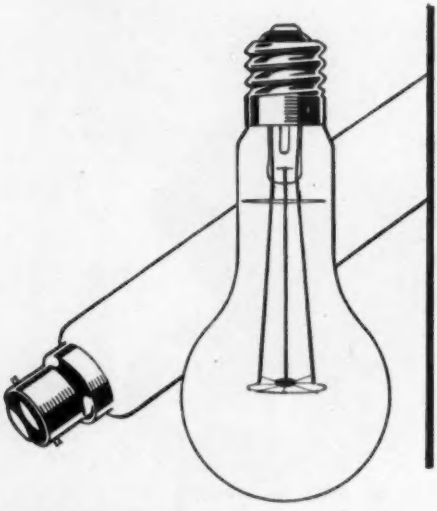

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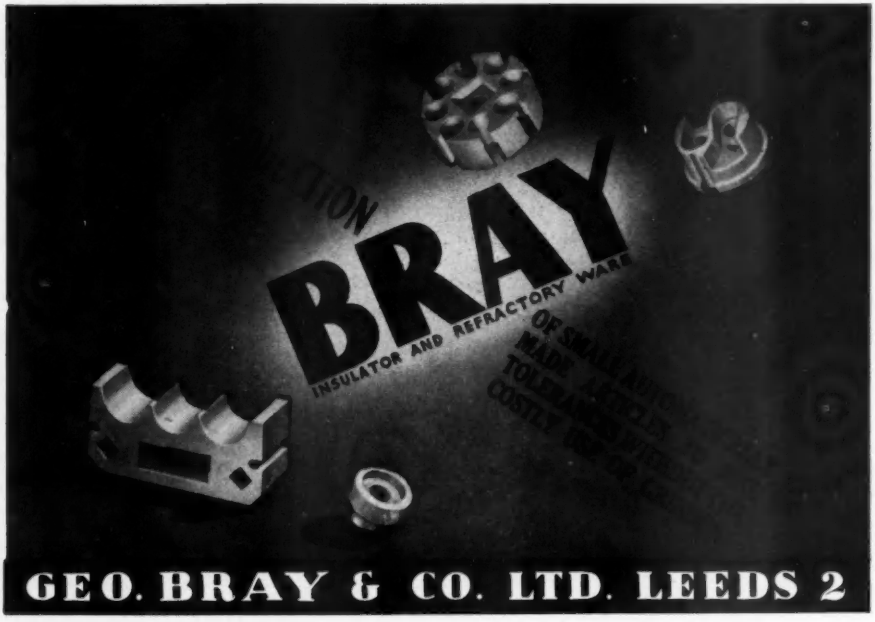

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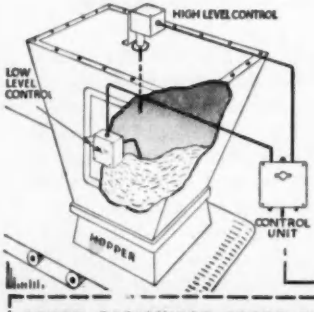

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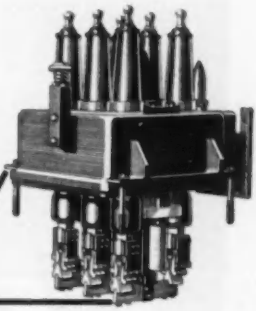

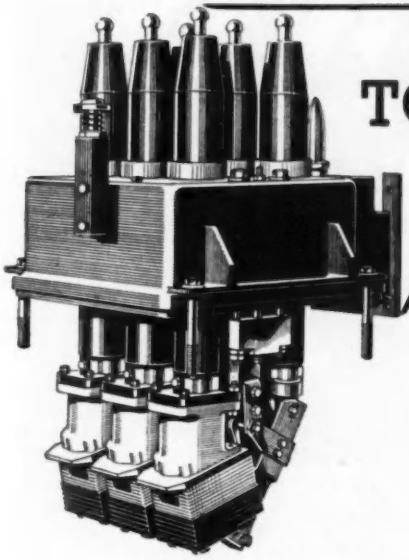

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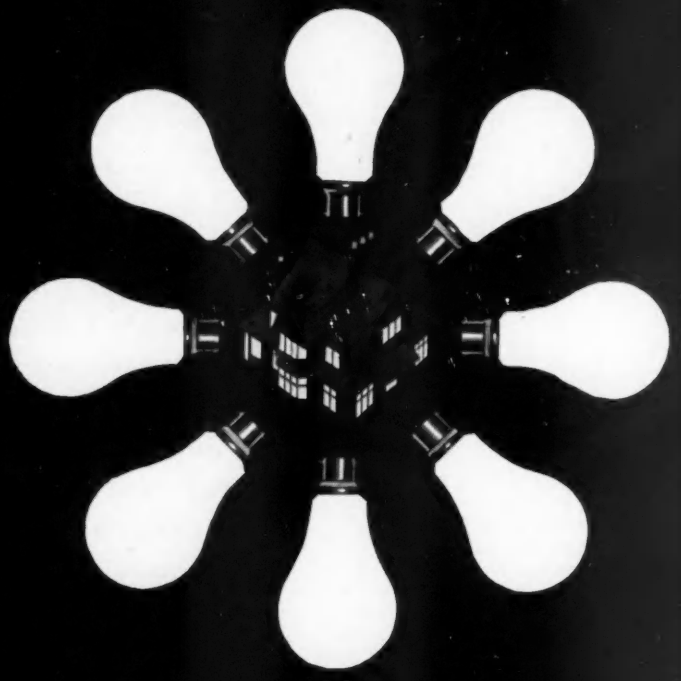

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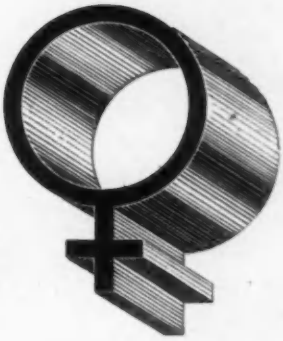

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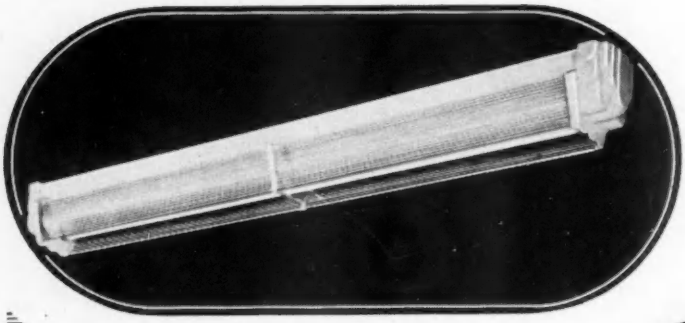

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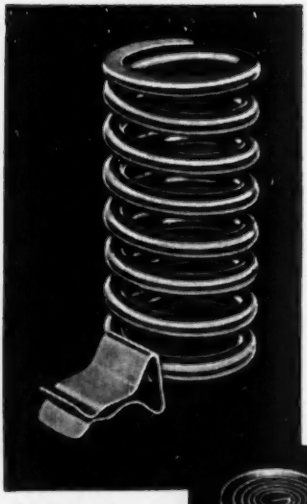

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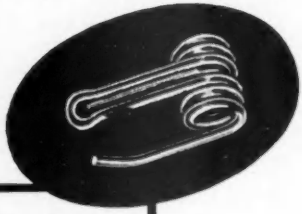

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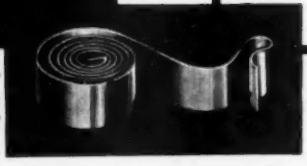

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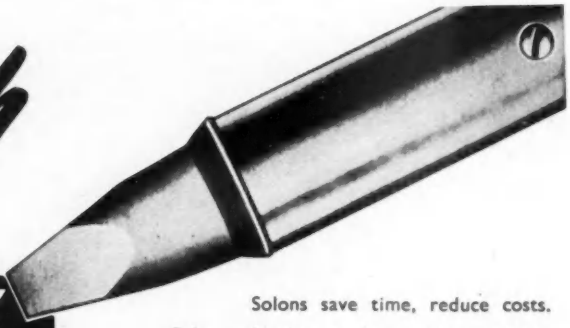

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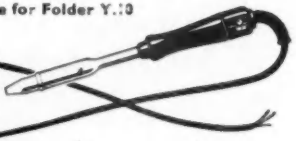

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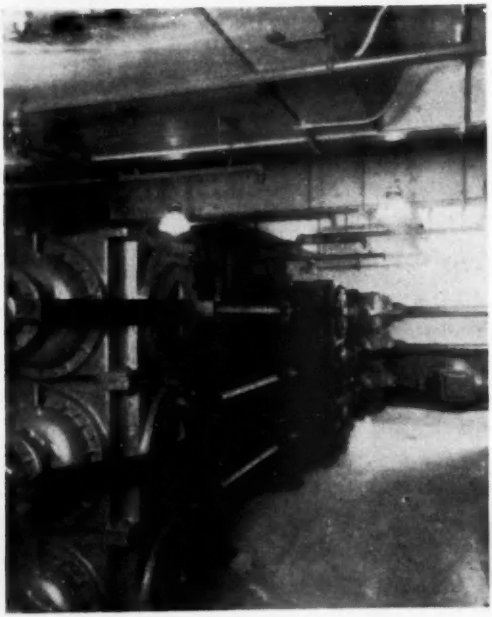

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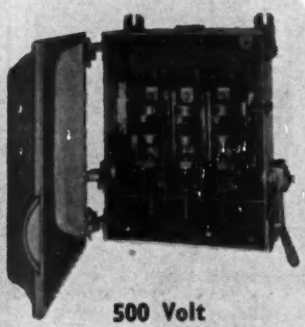

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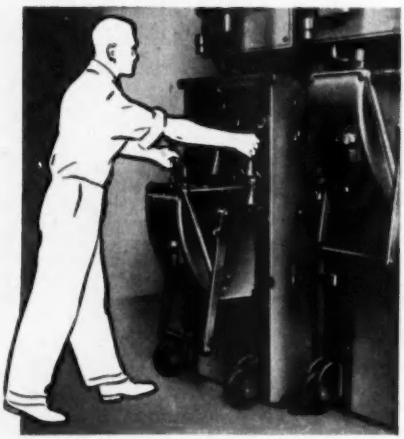

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Volume 123 No. 3203 26 MARCH, 1953

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Editorial

BETTER RESEARCH LIAISON

IS industry effectively learning of the discoveries of research scientists? Anyone who has to delve in the contemporary outpouring of papers, theses, reports and published articles may be forgiven for a first thought that it is certainly being told, if anything, too much; but that is to look at the question from the scientists' viewpoint. In self-critical mood, the Advisory Council of D.S.I.R. in its latest report puts itself in industry's position, and concludes that the admirable mass of new knowledge is not "getting through" to many firms who might apply it to their advantage. Some extra help is needed, and it is reassuring to learn that D.S.I.R. is actively experimenting, directly and through the research associations, with ways of giving it. Much may be possible by means of a strengthened information service, and the substantial American aid to be devoted to this end, which we noted a few weeks ago, should be of great assistance. At the root of the matter, however, lies the need for the employment in industry of trained scientists and engineers on whom responsibility can be placed for watching for scientific advances of use to their own firm. The appointment of such men is only one facet of the larger problem of scientific and technological manpower in industry, but until they are available and are given the necessary time to carry out this important task, individual concerns will continue in ignorance of discoveries that can improve their products and their productivity.

TRAINING AND RESPONSIBILITY

AFTER the many rather hackneyed views on educating the engineer to which we have had to give attention, it was refreshing last week to come across a treatment which seemed essentially practical in its approach. A symposium, organised by old students at the City and Guilds College, was the occasion; and perhaps the venue, the engineering section of the College chosen by the Government for its main expansion of technological teaching, proved inspiring; undoubtedly the impressive range of experience amongst the speakers, representative of industry, the universities and the professional institutions, did much to ensure that the speeches were worth hearing. Amongst many weighty points that were made, we noticed particularly agreement between teachers and industrialists that undergraduate training should not be too prolonged; an engineer should obtain some experience of industry at an early date. This is welcome support for a view we have long held, for with later school leaving, national service, and now the threat of four-year-degree courses, with a two-year post-graduate apprenticeship to follow, there is a danger that a man will be 28 or more before he has any opportunity of taking responsibility. This is wholly undesirable: far more acceptable is the alternative of advanced engineering training at a later stage in a man's career, preferably full-time at a university. Though it is temporarily inconvenient to employers to release men when they are becoming useful, both industrialists and the teachers enthused over the effectiveness of this method.

JUDGING OIL

IN modern systems of transmission and distribution with their associated transformers and switchgear, oil may truly be said to be one of the primary insulators. Yet over the past few years doubts have arisen as to the practical value of measuring the electrical characteristics of oils with any great degree of accuracy. Such precise measurements as have been taken have only proved how recalcitrant is oil to absolute measurement. Dr. Brazier, for example, pointed out in the recent Symposium on Insulating Materials, organised by the Institution of Electrical Engineers,

that when C.I.G.R.E., just after the war, sent a standard oil to different laboratories to ascertain the agreement in measuring loss angle, hardly any of the results were in agreement. In many cases the difference was of the order of ten times. Numerous theories have been propounded to account for this variation, and several intensive investigations have been carried out, and the fundamental fact has emerged that, in this case at least, the "sample is not necessarily representative of the whole." Such items as temperature, oxidisation, and minute impurities have great effect. The power engineer, however, can take heart from Mr. Norris's eminently practical contribution to the effect that from the engineers' viewpoint, the electrical strength and crackle test of oil, combined with sniffing and looking at it, has much to commend it.

WIRING ECONOMY

LAST Thursday's I.E.E. Utilisation Section discussion on economy of materials used in wiring gave engineers an opportunity of answering back to the Ministry of Works. The Ministry's memorandum on the subject, published last July, aimed at conserving supplies of copper and steel, while maintaining adequate standards of design and workmanship: inevitably, therefore, it implied that present practice was unnecessarily prodigal in its demand for these metals. Thursday's counter-attack on this professional slight was two-pronged. First came the suggestion that if material is saved by the use of smaller cross-sections and lighter construction, there is a disproportionate loss, because of the extra cost of longer job hours and necessarily increased supervision, and of increased I^2R losses. More subtle, and indeed, more fundamentally important is the second riposte. Extravagance in specification and design is attributed to lack of time: the electrical engineer is seldom accorded a period to prepare his plans, as lengthy as the architect claims to be his right. A few per cent has to be added to cover possibilities not investigated for lack of time, and in all probability the allowance for diversity factor, which is made under Regulation 303 of the Institution's wiring rules, is ultra-conservative. This is a problem which no up-rating of cables will solve; improvement can come only from an increased recognition of the importance attaching to the electrical installation in any building, large or small, and the consequent allowance of an adequate period for design.

METHOD IN MAINTENANCE

IT is comfortably simple for the maintenance engineer in a factory to wait for plant to break down and then to repair it. Moreover, it can be rewarding: his services in getting production under way again are at a premium, and he becomes a power to be reckoned with in the internal organisation of the factory. Management today, however, is becoming increasingly conscious of the basic fact of all efficient maintenance, that it is much more economic to have no breakdowns at all, even though to approach this happy position, considerable expenditure is necessary on routine inspections that may produce negative results for years at a time. For the electrical maintenance engineer, who must above all else be a practical man, this methodical proceeding has the great disadvantage of involving more paper work. Yet once a system has been organised, the despised form filling can become as useful a tool in avoiding trouble as the test lamp and the feeler gauge. Organisation is the crux of the matter, and it is on this that our main article for this week concentrates. We recommend its suggestions to the attention of our readers, for they have been tried in practice, and have proved adaptable to the varied requirements of individual installations.

Meteor

We hope to give you a personal welcome on stand 92 at Earl's Court this week

The Organisation of Factory Electrical Maintenance

DETAILED PLANNING CAN STEP UP EFFICIENCY

By H. E. KEARSEY, A.M.I.Mech.E.

THE recently published Report of the Anglo-American Productivity Team on Plant Maintenance has focused attention on the possibilities of improving the organisation and effectiveness of industrial maintenance departments, particularly those concerned with the upkeep of process plants and machinery.

To quote from page 1 of the Report: "It is now generally accepted that the only way to maintain our standard of living in this country is to maintain and increase our rate of industrial productivity. Industrial productivity depends primarily on three factors, each interlinked with the others. These factors are, first, efficient management and organisation; secondly, good technical methods and equipment; and thirdly, good co-operation by labour.

"However efficient and up-to-date a piece of productive machinery may be, or however well organised a particular process, its ultimate value will depend on its being ready and available in full working order in accordance with an agreed programme. Again, in regard to the comfort of operatives, optimum production cannot be reached unless proper working conditions are maintained, and heating, ventilating, air-conditioning and allied plant kept in good service order."

Methodical Prevention

The broad implications are obvious. Potential sources of plant breakdown must be detected and the necessary preventive action taken in order to avoid costly failures in the continuity of manufacture. Inspection and servicing of plant must be organised and scheduled in a methodical and economic manner. Shut down of plant must be planned ahead in order that necessary overhauls can be executed at times convenient to the requirements of the production programme. The emphasis is upon avoidance of breakdown rather than speed of repair. In current terminology, this form of maintenance is sometimes termed "planned," sometimes "scheduled," sometimes "preventive."

There are many reasons for the interest in preventive maintenance methods which have become evident during the last five years. Most are well known and are concerned with the reduction of down time.

First and most important is the essential need for maximum productivity which happens to coincide with a shortage of modern capital equipment and of manpower. Full use must be made of existing facilities, particularly the latest and most efficient.

Secondly, the majority of manufacturing organisations have production control schemes designed to "spotlight" the down time of plant and machinery. Output targets have been measured and assessed. The causes for any failure to achieve the targets must be explained. Plant breakdowns are the responsibility of the maintenance department.

Thirdly, down time reduces the earnings of the production workers when on payment by results. With the increasing application of such schemes, and the need to foster good personnel relationships, this factor is of greater importance than may be generally appreciated.

Fourthly, mechanisation of manufacturing processes is leading more and more to the adoption of continuous and flow production layouts. A breakdown has far-reaching results. A failure in one small piece of equipment may

put a most expensive process chain out of commission with costly loss of output, overhead charges, and workers' earnings.

Fifthly, modern management policy and practice organises production through the medium of forecasts, plans and programmes. Their successful conduct and execution depends entirely upon the smooth and consistent functioning of plant and machinery. Individual breakdowns can completely dislocate the output programme of an entire factory, particularly when processes are closely related.

Sixthly, safety precautions can be adequately met only through the carefully scheduled examination of electrical equipment used by production workers.

While both the production executive and the works engineer are agreed on the desirability of introducing preventive maintenance, opinions are not so unanimous on the methods to be adopted in detail and on the degree to which they shall be applied. Two factors always to be kept in mind are the necessity to keep paperwork to a minimum and the importance of securing the utmost co-operation from all ranks in the maintenance staff.

Types of Maintenance

While the Team Report classifies types of maintenance under five headings (as controlled by production supervision, breakdown, scheduled, planned and preventive), and explains their characteristics and relative merits, the last three have much in common with regard both to techniques of application and to aims and objectives. Each of these three types of maintenance should make use of analysis, measurement, and control with the purpose of ensuring economy in maintenance together with reduction in plant down time.

TABLE 1. STEPS IN SETTING-UP A PREVENTIVE MAINTENANCE SCHEME

1. Preparation.	Survey and listing of plant and equipment. Analysis of potential sources of down time. Determination and scheduling of inspection and overhaul frequencies. Preparation of work specifications. Assessment of manpower requirements. Summarising of work loads.
2. Introduction and application.	Allocation of work loads. Preparation of programmes and rotas. Issue of instructions. Use of work sheets and inspection reports.
3. Control.	Initiation of action as a result of inspection reports. Recording of progress. Control of replacement parts. Cost comparison.

The term "preventive maintenance" will henceforth be used, in this article, in its widest sense, i.e. as referring to any well organised and economical procedure, set up on analytical lines, with the specific aim of minimising the breakdown of plant and machinery. No attempt will be made to differentiate between "planned," "scheduled" and "preventive" as separate terms. To justify "preventive," a scheme must involve the use of both planning and scheduling and should be the most effective that can be devised for the particular situation.

A preventive scheme for factory electrical services visualises four distinct classes of work as occurring within the scope of maintenance and repair activities: 1, Routine maintenance: scheduled inspection and servicing. 2, Repairs: mainly initiated from routine maintenance reports. 3, Breakdowns: including emergency services of a minor character. 4, Planned overhauls: scheduled on a periodic basis.

These divisions are clearly defined and provide a most useful basis for broadly analysing maintenance expenditure and man hours. Taken over a long term, increases or decreases in the relativity of their totals can be significant in showing the economy of the maintenance methods in use. The effectiveness of maintenance, judged both from the amount of its cost and its value to the production departments, cannot be really accurately determined and, at best, can only be measured by the aggregation of several such methods of comparison.

TABLE 2. ROUTINE MAINTENANCE: WORK TO BE CARRIED OUT DURING MONTHLY INSPECTION AND SERVICING

Type of Plant	A.C. motor, variable speed, commutator, under 50 h.p.
Description of Work:	
Inspect commutator.	
Inspect flexible leads (or connector plates) to brushes.	
Inspect earthing.	
Inspect conduit covers.	
Inspect state of lubrication.	
Inspect condition of cables (where visible).	
Inspect for loose connections.	
Inspect and test interlock switches.	
Inspect and test mechanical brush operating gear.	
Inspect and test controller.	
Inspect and test overload settings.	
Inspect and clean slip rings.	
Inspect and clean air filter.	
Inspect and clean brushes and brush holders.	
Test and adjust brush tension.	
Inspect levels of overload dashpots, re-filling if necessary.	
Listen for bearing noises.	
Blow out inside motor casing.	
Clean floor area surrounding motor.	
Clean outside of motor casing.	
Clean guard rails.	
All loose connections and fastenings to be tightened.	
All necessary replacements of a minor character to be made.	
Inspection results to be entered on a report form.	

The preventive scheme, which embraces

WORK LOAD SUMMARY

DATE OF PREPARATION JANUARY 1953 DEPARTMENT MILL 'A' DATE 1953

PLANT No.	JOB	TIME ALLOWANCE IN HOURS FOR FREQUENCY								TOTAL ALLOWED HOURS				COST BUDGET
		DAY	TWICE WEEK	WEEK	TWO WEEKS	MONTH	THREE MONTHS	SIX MONTHS	YEAR	P	T	S	M	
L 34	LIFT: MILL 'A'			1P		2P 2M 2M	9P 9T 9M			112	36		84	£ 75
L 35	LIFT: MILL 'A'			1P		2P 2M 2M	9P 9T 9M			112	36		84	75

Note: P signifies specialist tradesman; T, tradesman; S, service man; M, mate

Fig. 1. Rulings for a typical work load summary form, based here on a production department

routine maintenance and planned overhauls, involves three steps or stages in its installation and running, and these are shown in Table 1.

The procedure set out can be applied in principle and practice to any branch of maintenance service, to any type of production, and in any industry. The degree of success will depend upon use of the techniques of analysis, measurement, and comparison in conjunction with practical knowledge and experience.

Plant Register

The compilation of a plant and equipment register must be the first move. If already existing, some modification of its form and amplification may be necessary to fulfil essential requirements of the scheme. While the register of electrical plant must be an integral part of the register of the whole plant and services, information can be abstracted in supplementary form. For example, a process plant having six motors will be identified and recorded under "Process Plant" and the six motors will be separately identified and described in the "Electric Motor Register." The scheme of identification, whether numerical or alphabetical-numerical, can be designed in several ways, all equally satisfactory.

Machines and equipment should be clearly marked, preferably by an engraved or stamped identification plate. Each item of equipment should have its own record card giving all relevant information concerning manufacturer, description, capacity, characteristics, site, and purpose. In addition, depending upon the clerical organisation of the scheme, the card may include particulars of frequency and scope of overhauls and inspections and possibly costs of maintenance. The record cards should be filed in some kind of visible index cabinet which permits the "signalling" by means of coloured tabs of special conditions, circumstances, or requirements concerning each item of equipment.

Frequency of Inspection

Each item or, in some cases, class of plant, must be studied to find out its potential sources of breakdown or inefficient functioning. These must be listed in order to provide a basis for determining the frequency of inspections and overhauls. Of course, these frequencies also depend upon the utilisation of the particular plant and equipment. Overtime, shift, or continuous employment necessitates more frequent inspection and overhauls than the working of normal hours. This study and analysis of points for attention on each item of plant also provides a check list when drawing up inspection report forms and work specifications. Its most important purpose, however, is for determining: (a) The frequencies of inspection and servicing, e.g. daily, weekly, fortnightly, four-weekly and their combinations. (b) The distribution of tasks and responsibilities between individual maintenance men. (c) The frequency of overhaul.

Scheduling of Inspection

At this stage the plan of inspection and servicing must be formulated with regard not only to the specification of work to be done at each periodic visit to the item of plant (i.e. what is to be done daily, weekly, and so forth) but also to the division of the required work

(i.e. whether the work should be allotted between specialists, tradesmen, or semi-skilled service men). Consideration should not yet be given either to the work loading (i.e. allocation of work to individuals) or to programming (i.e. deciding when the work shall be done).

The division of work can be decided only by the particular circumstances. Two influential factors are the type and size of production plants and the degree of skill and knowledge required in their maintenance. For example, on a large process plant, it may be expedient for one man to deal with process control equipment, another with switchgear, and a third with motors. Again, it may be desired to allocate the cleaning, lubrication, and certain features of minor servicing to semi-skilled men working independently instead of as mates to tradesmen.

As already mentioned, at this preparatory stage, the availability of plant for maintenance is not taken into account. The purpose is to schedule and specify the amount and kind of inspection and servicing deemed necessary to keep the plant in a reliable condition. The arrangement of the tasks comes under the application stage of the scheme. Electrical maintenance has to be dovetailed in with mechanical maintenance.

A specification, or itemised description, of the inspection and servicing to be carried out at each periodic visit should be made in writing for each type or piece of equipment. A copy should be kept by the foreman and another may be issued to the maintenance man or at least be available to him for reference. The degree of detail on the specification sheet will vary with circumstances (Table 2).

Work Assessment

An essential part of the preparatory stage is the determination of the amount of time required to perform each of the various tasks effectively and economically. This is known as work assessment or, to use a production term, work measurement. The planning of preventive maintenance cannot be carried out without knowledge of how long each periodic task should take, and the plan cannot efficiently function unless the tasks are executed properly within these allotted times.

The work involved in planned overhauls can be analytically estimated. Each overhaul is first broken down into: 1, Dismantling; 2, Reconditioning; 3, Reassembling and re-erecting.

The elements of work concerned with the first and third can be foreseen and appropriate estimates of performance time be made. The amount of reconditioning required can be determined by inspection of assemblies and components after the completion of dismantling, when performance times can similarly be assessed.

Having decided upon the amount and frequency of routine maintenance and assessed the required times, a work load summary can be prepared. This is a statement of the required times, listed under items of equipment and attendance frequency, from which the total manhours and budgeted cost can be determined. The work load summary, however, will not indicate the number of men needed to meet the maintenance plan as the availability of the plant has also to be considered. The form of a typical work load summary is shown in Figure 1. Work load summaries can be based upon departments or upon classes of equipment, i.e. a summary can be prepared for each production department or for equipment groups such as lifts, motors, h.t. switchgear, and so forth.

Application of the Scheme

The introduction stage includes the drawing up of programmes and rotas, the issue of instructions, and the use of work sheets and inspection reports.

Programmes are required to dovetail the routine maintenance plan with the production plan and must be drawn up periodically to meet the changes which must inevitably take place in the availability of plant for maintenance. Where plant can be shut down during normal working hours, the programme offers no difficulties in preparation, but more often the allocation of tasks during meal breaks, evenings, nights, and weekends is involved.

Programme preparation, which can be most conveniently done on a weekly basis, involves the long-term covering of the maintenance plan and the negotiating of availability of plant with the production management. The detailed allocation of tasks to be carried out by individual men at specific times can best be done on a daily basis. This division between weekly programming and daily allocation of work offers a suitable line of demarcation between the function of planning and the function of executive supervision (Fig. 2).

Where a maintenance and construction department is sufficiently large in size to justify the establishment of a planning section, its duties will include the breaking down of the maintenance plan into weekly quotas of work and the arranging of plant availability for the purpose. In smaller organisations, the duties will be carried out by the assistant

engineer or by a specially appointed engineering assistant. The foremen are then responsible for the actual detailing of men to their specific tasks in accordance with the weekly programme and the indicated plant availability. Each day's allocation of work should be made on the previous afternoon and submitted for approval by the foreman to his next executive superior. The follow up to see that the programming and work allocation is really meeting the scheduled requirements of the maintenance plan is a part of the third, or control, stage of the scheme.

PROGRAMME

ELECTRICIANS — WEEK ENDED 21-3-53

PLANT No	JOB CARD No	JOB	FREQUENCY	ALLOWED TIME IN HOURS P	T	S	M	AVAILABILITY FOR MAINTENANCE
L 34	642	LIFT: MILL 'A'	THREE MONTHLY	9	9		9	SATURDAY 21st
L 35	642	LIFT: MILL 'A'	"	9	9		9	" "
L 36	642	LIFT: MILL 'B'	"	9	9		9	" "
L 37	642	LIFT: MILL 'B'	"	9	9		9	" "

Fig. 2. Form of ruling for weekly programme card

The foreman must be primarily responsible for the satisfactory functioning of the clerical procedure involving work sheets and inspection reports. Both of these records are essential. The maintenance men should be issued with written or pre-printed work sheets, giving particulars of the tasks to be performed. There are two methods in general use. In one case, all the day's allotted tasks are entered on a single work sheet. In the other, a separate sheet or card is made out for each task. The separate card method has an advantage in that most of the information concerning each task can be pre-printed on the appropriate card ready for issue by the foreman. With the allocation of work sent weekly to the foreman is a card for each task included in this programme. The issued information should include particulars of plant availability and time allowed for each task. The foreman's signature on the sheet will signify the satisfactory completion of the work.

TABLE 3. EXTRACTION OF NECESSARY INFORMATION

Routine maintenance.	From the scheduled frequencies and standard times, cost budgets can be prepared: actual costs in total being compared periodically with the budget.
Repairs.	The actual cost of repairs can be compared month by month as totals. In detail, individual expenditure will be shown by authorisations resulting from inspection reports.
Breakdowns.	The actual cost of breakdowns, so far as the maintenance side is concerned, should be obtained monthly.
Overhauls.	The cost of overhauls can be budgetted in the same way as routine maintenance, actual costs being compared periodically with the budget.

As already stated, the use of inspection reports is essential. A report sheet may be made out for each item of plant, if of some magnitude or importance, or may cover a number of smaller items of a similar character. A report sheet, particularly if in the form of a check list, serves to impose a sense of responsibility on the man making the inspection and as a reminder to management for the arrangement of indicated repairs and replacements.

Control Stage

From the report forms are abstracted particulars of the repairs found to be needed as the result of inspection and servicing. These repairs are handled in accordance with their relative urgency, availability of plant for repair, existing priorities, and immediate availability of replacement parts. Repairs will be authorised by the various levels of management according to the amount of expenditure which they may incur.

Another aspect of the control side of the scheme is the keeping of progress records which show if the actual performance of inspection, servicing, and overhaul is meeting scheduled requirements and, if not, when and where the actual performance is falling behind schedule. A recommended ruling for a progress record is illustrated in Fig. 3.

Again, the scheme of maintenance organisation lends itself to the control of expenditure. The division of activities into routine maintenance, repairs, breakdowns and overhauls offers the analytical approach which is so essential to the practical utilisation of cost information. This is shown in Table 3.

Use of Work Study

Work study consists of two main constituent techniques, each complementary to the other. (*a*) Method study: The detailed analysis of existing or proposed methods as a basis for their improvement within the limits laid down by technical requirements. (*b*) Work measurement (sometimes known as time study): The assessment (or measurement) of performance standards by the use of timing and rating.

MAINTENANCE PROGRESS RECORD
INSPECTION AND SERVICING

SECTION LIFTS PERIOD 1963 FREQUENCY MONTHLY

PLANT No	JOB CARD No	JOB		J 1	F 2	M 3	A 4	M 5	J 6	J 7	A 8	S 9	O 10	N 11	D 12		
L 34	642	LIFT: MILL 'A'															
L 35	642	LIFT: MILL 'A'															
L 36	642	LIFT: MILL 'B'															
L 37	642	LIFT: MILL 'B'															

Fig. 3. Rulings for a typical progress record card

There is also a more approximate technique of work assessment, called analytical estimating, specially applicable to non-repetitive work, which uses the principles of work measurement in conjunction with practical estimating to determine the work content of the various tasks.

The value of both techniques, when organising a preventive maintenance scheme, is only too obvious, as the productivity team report emphasises at some length. Method study investigates and determines the best way of doing a job. Work measurement decides how long a job should take to perform (i.e. its work content). One large industrial concern in Great Britain has done much pioneering in this field and has successfully introduced the techniques in many plants throughout the country. Other concerns have similarly applied the principles of work study to maintenance jobs during the past three or four years.

Method Study

Method study is simply a logical approach in accordance with a basic procedure. The steps or stages in this procedure are: (*a*) Select the work to be studied; (*b*) record all the relevant facts of the present (or proposed) procedure; (*c*) examine these facts critically and in ordered sequence; (*d*) determine the most practical, economic and effective method, with due regard to all the circumstances; (*e*) install this method as standard practice.

This procedure can obviously be applied with advantage to the study of routine maintenance tasks as well as to the planning of overhauls.

There are, however, certain difficulties which have to be overcome in practice. First, there is the problem of integrating work study into the maintenance organisation. Generally speaking, to ensure the maximum of co-operation from all concerned, the practice of work study must be conducted by staff within the maintenance organisation. This means that numbers of the maintenance staff must be trained in the principles and practice of work study or, alternatively, that ready-trained practitioners must be introduced. Only the larger concerns can afford the latter course. If the production side of the business has a well-trained work study staff, arrangements can sometimes be made to train members of the maintenance staff in the principles, leaving the practice to be learned from experience.

Secondly, there may be active opposition or passive resistance to the use of the stop watch. While the feeling is not so strong as a few years ago on account of the general acceptance of work study by the trade unions at national level, local and shop reactions have to be considered and satisfied. There will always be objections against the use of split-second timing such as used in the study of repetitive work. But with maintenance work this degree of accuracy will rarely be necessary. Method study requires only the observation and recording of duties and activities. While analytical estimating—the form of work measurement used for maintenance—does involve a certain amount of stop-watch timing, an ordinary wrist watch can usually be used quite effectively for much of the work.

Incentives and Bonus Schemes

The use of work study does not necessarily involve the application of incentive payment, but at the same time there is no doubt but that maintenance workers will be more co-operative and responsive to the applications of such methods if their earnings are increased as a result. Again, the fact that the production

workers in the factory will most probably be making high earnings due to incentive payment, does mean that some scheme for increasing the earnings of the maintenance workers must be introduced to avoid invidious comparisons, with accompanying dissatisfaction.

There is a case for the application of some form of bonus payment in return for the achievement of a reasonable standard of efficiency in performance. This does not mean that a man is given unlimited scope in potential bonus earnings in the same way as the production worker, but that he can earn some reasonable amount over and above his basic pay in return for the proper execution of specific tasks within a given time schedule. Such a scheme of bonus payment fits well into a system of preventive maintenance as it encourages and virtually ensures the performance of the scheduled tasks within the planned times laid down in the maintenance programme. This scheme can be termed a "task bonus," and implies the payment of a fixed amount of bonus in return for the execution of the allotted duties within a specified or planned time. It does not involve an increase in bonus earnings with a reduction in the time taken to carry out the work. The time allowed, determined by work study, is regarded as a reasonable allocation that may be justifiably spent, and it is assumed that the man will use this allotted time in an effective manner.

Merit Rating

Merit-rating offers an alternative means of providing an opportunity for securing higher earnings. It is a scheme which endeavours to relate the amount of bonus payment to actual worth or merit of the individual employee by a periodic assessment in terms of points. This assessment takes into account as many of the desirable attributes for performing a job as may be deemed necessary. Typical attributes are quality of work, quantity of work, knowledge, reliability, co-operation, general behaviour, initiative, time-keeping, versatility, and safety consciousness. A scale of values in terms of points is set up as maximum for each attribute, and this scale is used in the periodic assessment of each employee's performance, the sum of the scores in points giving the total score for the individual employee. The score in points gives an index figure on which the weekly bonus of the employee is calculated. As a payment for merit, it has the advantage over the grant of a rise in weekly rate of pay in that the amount can be varied periodically instead of being fixed and permanent irrespective of the individual's actual performance.

Promotional Activities by Boards

SPEAKING at the opening of the annual conference of Electrical Housecraft Advisers and Senior Demonstrators, organised jointly by the Electrical Association for Women and the Electrical Development Association, Lord Citrine forecast that the Electricity Boards would soon be permitted to engage in a "reasonable measure of promotional advertising."

Stressing the need to put over the message that electricity boards were now able to sell as much power as required, with perhaps the exceptions of periods of extremely cold weather, he said that by that he didn't mean the incidence of bitter competition with the other industries. When working together in the service of the community industries observed a certain code of conduct. He emphasised that the gas industry had been very "ingenious" in their promotional activities and had evoked some criticism from the electricity supply industry. But the industry should not decry its competitors. Good salesmanship, he said, consists in pointing out the advantages of one's own products and services. He said that healthy competition between gas and electricity industries was in the consumers' interest.

After surveying the progress of the industry since vesting day, Lord Citrine said that the increase in sales this year will most likely be about 3% as opposed to the usual 8%, but that there was no evidence that the price of electricity was preventing a more rapid development. He said the Boards' policy was to keep prices down to the lowest compatible level, despite increases which had to be borne by the industry. He anticipated that the B.E.A.'s record of never having an overall deficit will be maintained this year, although the industry would have to pay £12 m. more this year for coal alone.

He pointed out that there had been a bigger recession in industrial demand than the domestic demand in the last few months, and he thought that this could indeed be the major factor which had restricted the rate of increase.

If the Boards were to keep prices from rising, they must be able to sell infinitely more electricity and so keep more generating plant on load throughout the twenty-four hours. At present it worked 47% of the time.

Our readers' views . . .

Coal Shortage

THE last rise in price of solid fuel brings us to the point when industry generally will have to consider how much longer it can remain tied to coal for light, heat, and power.

It has been said that miners will never again allow large stocks of coal to accumulate for the reason that it would be then impossible for a labour dispute to drag on for weeks as happened between the wars. If this is so, we are destined to live hand-to-mouth as far as coal supplies are concerned for ever.

Every year sees more reliance being placed upon imported oil to generate electricity or to operate transport, but there are limits to the amount of this expensive fuel which can be imported, apart from the undesirability of putting so many eggs in this vulnerable basket.

While solid fuel gets scarcer and more costly, politicians and economists argue as to how it should be used whilst the industrial life of Britain slows down. It is surely time that the Government gave top priority to the development of atomic energy for the generation of electric power. The day when the B.E.A. generates the bulk of its supply by nuclear fission cannot come too quickly.

One may ask what will happen then to the "unwashed smalls" which the B.E.A. now burns so efficiently? I would respectfully suggest that the N.C.B. could send it to the gas industry—they have told us for years that they can make the best use of the nation's coal. This would be their opportunity!

BMJSRHQ

LONDON

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"Speed Wire"

IN your issue of March 5: I was interested in Megohm's mention of "figure 8" T.R.S. Cable "Speed Wire" as being used in Australia. He mentioned we had a similar cable in this country about 1933. I think I know the cable he may be referring to as I must have installed several thousand yards of it round about that time, both in twin and triple. Providing a good man was handling it a fine job could be made, such as dropping from ceiling level to switch or from floor level up to switch. Covered with casing it made a very neat job. An all-surface job could be made very neat indeed especially on wood work or beams or plaster ceilings with the cabling neatly set into ½ in. blocks making a most satisfactory and firm job with semi-recessed switches and switch plugs. For domestic work I thought it was good and have often wondered why it lost favour; t.r.s. with ½ dozen buckleclips down to a switch or a piece of capping covering from floor level to switch is most ugly when the switch is not even recessed in a 1 in. block, and it is very difficult to make a neat job where all the work is surface. Why have semi-recessed fittings gone so out of favour? I would venture to suggest if we have not gone back for neatness in this type of work since 1933 we have certainly not made great strides forward, especially when t.r.s. can come so much into its own on domestic work by assisting to eliminate this troublesome earth question which we take more seriously today than we did in 1933 and quite rightly so.

Looking forward (in curiosity) can we venture to hope the new 13th Edition will have a few "definites" and not so many "assumed and suggested" which should improve installations considerably as most people would then know what was expected of them.

R. B. A. Jones

OTLEY

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Outlets and Architects

I AM in complete agreement with your editorial remarks that a vigorous campaign is needed at once to educate architects and others to the vital need of the provision of an adequate electrical installation in dwellings.

The Report to the Minister of Housing by the Committee on House Interiors that the number of lighting points and socket outlets be reduced to a minimum number is based, of course, on a well intentioned desire to reduce the cost of housing but what are the facts? The cost of an installation consisting of two lighting points and three socket outlets in living room and kitchen, one lighting point and one socket outlet in all other rooms except principal bedroom in which two sockets are provided, is approximately 2¼% of the cost of the building works only, or less than 2% of the total cost including land, etc.

It is clear, therefore, that a substantial saving

in cost cannot be made by omitting two or three points and, since the installation work is invariably carried on at the same time as other trades, no reduction in completion time would be made. Moreover, the Area Boards are generally willing to bear the cost of installing the mains network to estates, or to make nominal service charge only, providing that the installations in the dwellings are such, that an adequate revenue can be expected. If the number of points of the installations be reduced, then this condition will not obtain and the Boards may have to consider recovering part of the network cost by increased service charges. This increase, if made, will almost certainly completely offset any saving which might be made on the electrical installation.

An installation to minimum standards will, as you rightly point out, be unsatisfactory from all points of view and the high cost of adding additional points (at least four times the cost of installation during building) will ensure that it will only be a matter of time before flexibles and other undesirable extensions to the wiring make their appearance.

It is to be hoped that local authorities and other bodies concerned with building will consult electrical engineers before proceeding with the recommendations of this report.

R. F. Kenchatt, A.M.I.E.E.
PLUMSTEAD

Electrical Wholesalers' Federation Dinner

AN enjoyable evening was had by the large number of members and guests attending the Annual Dinner of the Electrical Wholesalers' Federation at the Dorchester last Thursday. In the unfortunate absence of the Rt. Hon. A. T. Lennox-Boyd, who was unable to be present due to pressure of work, the toast of "The E.W.F." was proposed by Capt. the Lord Teynham, D.S.O., D.S.C., R.N. (Rtd.), who referred to his connection with the electrical world as dating back to his early days in the Navy, when he was concerned with wireless telegraphy in Signals. He mentioned the vital position of wholesalers as a buffer in industry, ironing out the variations in demand from the public and thus evening out factory production.

Replying to the toast, Mr. W. H. Swain, President of the Association, remarked on the misunderstanding which existed both in the mind of the public and in M.P.'s as to the functions of wholesalers. If wholesalers did not exist, manufacturers would have to deliver direct to shops, and would have to bear the appropriate overhead charges which would be higher than those experienced by wholesalers.

The industry was magnanimous enough to believe that there was a rightful place in the national economy for solid fuel and gas as well. Electricity sought no privileged position and was quite content to compete fairly with each of the other two industries.

"Our Guests" was proposed by Mr. E. A. V. Peckham (Vice President), and Sir Harry Railing responded. He pointed out that although the wholesalers carried out an important task in the distribution of accessories, the manufacturer had to provide his own distribution channels where highly technical and specialised services were concerned. He suggested there was a widening scope for wholesalers in this field.

A view of the top table during Sir Harry Railing's speech. From left to right are seated Mr. A. B. Wildsmith, Capt. the Lord Teynham, D.S.O., D.S.C., R.N.(Rtd.), Mr. W. H. Swain, Sir Harry Railing (standing) and next to Sir Harry, Mr. H. M. Drake

From AN ENGINEER'S NOTEBOOK

ONE of the promising side lines of nuclear physics has been the development of electric generators using β-ray emitting isotopes as the primary power source. The stream of electrons which is given off by such isotopes is used to charge a form of low-pressure gasfilled capacitor which thus becomes the source of electrical energy. This direct conversion of nuclear energy into electricity is most stimulating to the imagination, but unfortunately, like its equivalent electro-chemical device, the fuel cell, its output in terms of power are extremely limited. However, it would seem to hold out more promise than the fuel cell, principally perhaps as a laboratory high-voltage source. Already models are available producing over 300 kV, but currents are of the order of 10^{-9} amps; however, the encouraging statement has been made that more suitable isotopes should become available in the future which will permit the production of tubes of higher power. But this must not lead us into undue optimism. Power as it is understood in the supply industry, even in the nuclear age, must, as far as we know, still depend on thermal generation. The most that it would seem possible to hope from this device is a new equivalent to a primary battery, and even that is still a long way off.

* * *

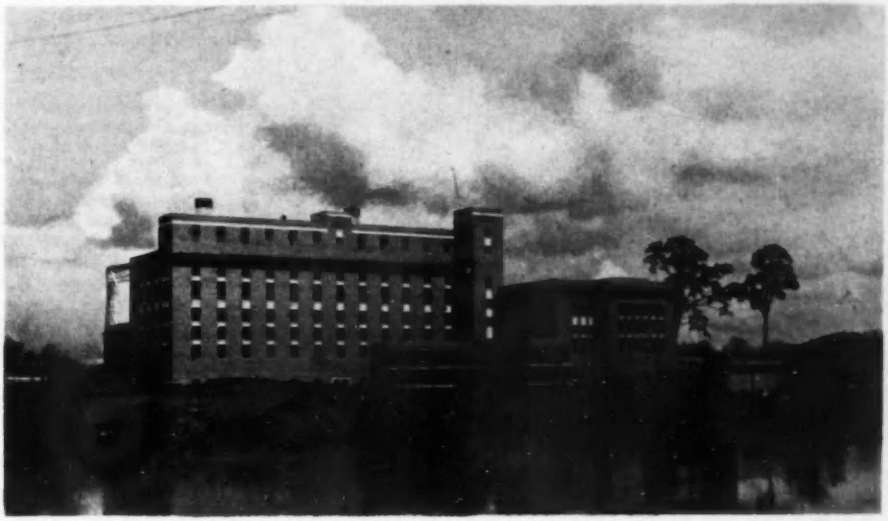
SOME years ago there was on sale a toy dog in its kennel, which, on calling its name, would spring forth to greet the caller. I am reminded of this by the development of an electronic device which has been devised in America to respond to numbers spoken into a microphone. The designers seem to have had no particular application in mind, but it obviously could be used for such apparatus as digital computors, if for some reason one wished to use the spoken word as the originating information. The most obvious question to ask on such a device is, how it spans the different pronunciations and dialects that it is bound to meet in practice? The simple answer is—it doesn't. It has to be calibrated, as it were, by first recording the operator's pronunciation of the numbers and then in operation any enunciated number is quickly compared with the recorded versions, the correct one selected and the appropriate signal transmitted to whatever apparatus it is required to actuate. While such a device is no doubt interesting to demonstrate and displays once more the engineer's ability to solve all sorts of complex problems, the method is inherently clumsy. While I have no wish to detract from the success in overcoming what is nigh an insoluble problem it seems to me that the task is not worth attempting until a simpler basis can be discovered of identifying speech sounds.

* * *

SUCH brief references as I have seen in the past to luminosity engendered by the impact of a shock wave, I accepted with some modicum of doubt. As a result of recent investigation, however, it seems that not only is the phenomenon reproducible, but that qualitative evidence is available of the nature of the luminosity. The tests have been made with a compression tube 7 ft long, containing nitrogen at a pressure of several atmospheres, adjoining an expansion tube over twice that length. The two are separated by a diaphragm which is ruptured to generate the shock wave. It has been established that the luminosity is a temperature phenomenon and with xenon as the favoured filling for the expansion tube, temperatures are found to increase as the initial pressure in this tube is reduced. The use of a high-speed camera has shown that luminosity takes place after the shock has been reflected from the end of the expansion tube and is confined in a roughly triangular region between the tube end and the reflected shock wave. Depending on the strength of the shock, the duration of luminosity is of the order of 1,500 to 3,000 microseconds. Spectrographic examination of the light has also been made, and with low shock strengths the lines of any metals present are readily observed, and from the evidence obtained it has been concluded that with shocks of increasing intensity an approach to continuous spectra should be obtained.

* * *

I SEE that there has recently been published in America a book analysing mathematically the functioning of the brain. From what little I follow of the reasoning it would seem that human behaviour has been reduced to a series of differential equations. I cannot help wondering whether one should use the so-called electronic brain for their solution. *E.R.G.*



Power for Malaya

Connaught Bridge Power Station Commissioned

ELECTRICITY for public supply was first introduced into Malaya as far back as 1904, when power was generated in Penang, and in 1905 a supply from hydro-power became available in Kuala Lumpur. Progress was fairly rapid, and in 1927 the Government Electricity Department became responsible for electricity supply in the four Federated Malay States.

By the outbreak of World War II, the total generating plant in the country had reached a capacity of about 140 MW, but the Japanese occupation, together with the "scorched earth" policy adopted by the defenders, rendered some 60% of this plant unusable.

In 1946, the Government took over control of all electrical generating plant with the exception of that used by private firms, and the system of Penang Municipality.

Further developments occurred in August, 1949, when the Central Electricity Board was formed, and in September this body took over all the undertakings operated by the former Electricity Department. Prior to this transfer preliminary work had begun on a new station in Selanger, to have an ultimate installed capacity of 80 MW. Preece, Cardew and Rider had been appointed as Consulting Mechanical and Electrical Engineers with Coode and Partners as the Consulting Civil Engineers. This station, which, providing no untoward incident occurs, is being formally opened by General Templar today, is known as Connaught Bridge Power Station.

Station Arrangement

The station is located on the Klang river, seven miles from Port Swettenham, and two miles from Klang. The site has easy rail access and takes its condensing water direct from the river. Preliminary work was begun in 1949 on the station and on the transmission system for providing bulk supply of power.

The final arrangement will consist of a turbine room, with four 20 MW Parsons sets in line, with two boiler houses, each containing four Babcock and Wilcox 120 klb/hr boilers running off at right angles to the turbine room. The four chimneys are located between the two boiler houses. At the moment, the first half of the station is substantially completed, and contains two turbo-alternators and one of the boiler houses containing four boiler units. The main buildings are steel-framed brick-panelled structures.

Both oil and coal can be used as fuel, the oil burners being located at the rear of the boiler furnaces. The oil is off-loaded from sea-going

This view of the turbine room shows the alternator end of the first machine. Note the positioning of the turbine gauge board between the h.p. ends of the sets

tankers at Port Swettenham, pumped to transfer tanks at the port by tankers' pumps and then through a separate pumping station over the seven-mile-long pipeline to the power station storage tanks. When coal is used, a coal-handling installation, capable of dealing with 200 tons/hr, comes into play. At present No. 1 boiler is oil-fired only, the remainder being equipped for both oil and coal.

The boilers are designed to steam at 425 lb/sq in. superheated to 825° F. Hagan pneumatic automatic boiler control is installed, together with automatic soot-blowing equipment.

Turbo-Alternators

The turbines are fairly standard, with operating conditions at the stop valve of 400 lb/sq in. 800° F. They are single-cylinder machines with straight exhausts and run at 3,000 r.p.m. Vacuum is low compared with British standards due to the high circulating water temperature of 85° F, and is about 27·75 in. Hg. at full load. Barring gear interlocked with the lubricating oil pump has been introduced on all sets.

A generating voltage of 11 kV, 3-phase, 50 c/s has been selected, the alternator ratings being 20 MW at 0·8 p.f. Cooling of the alternators is by separate fans.

A house set is also provided and consists of a 1,000 kW 3·3 kV alternator coupled to an eight-cylinder four-cycle diesel engine.

Owing to the circulating water conditions, the steam condensers are fitted with unusually large bore tubes having an external diameter of one inch. There are 4,986 tubes per condenser, each being 18 ft 6 in. long and they are made of aluminium bronze alloy.

The turbines are bled for feed heating at four points and one l.p. with three h.p. heaters are installed per set. Interconnections between the feed heating systems of individual turbines are provided on the suction and the delivery sides of the three electrically-driven feed pumps, at present installed. Each of these pumps has an output of 260 klb/hr of water against a pressure of 616 lb/sq in. at 179° F. They run at 1,500 r.p.m. and are driven by 315 h.p. direct-on-line starting 3·3 kV induction motors. An emergency steam-driven feed pump is also provided.

Water Supplies

At the power station location, the Klang river is tidal, and to ensure the c.w. pump suctions being drowned at all states of the tide the pumphouse has been built out into the river with the water intakes on the mid-stream side.

The c.w. pumps are of the vertical-spindle centrifugal type and will finally be five in number. Three are installed at the moment. Output capacity of each pump is 25,000 gal/min against an approx. head of 33 ft and they feed into a common bus main.

Auxiliary water services presented some difficulty due to the shortage of town's main water and also because the river, being tidal, has therefore a variable salinity. Settling tanks have been provided, which are filled at low tide when the salinity is a minimum by one of the 1,250 gal/min pumps provided for the purpose and located in the c.w. pumphouse. After settling, this water is pumped to over-

head tanks in the power station. Boiler make-up comes from evaporated town's main water.

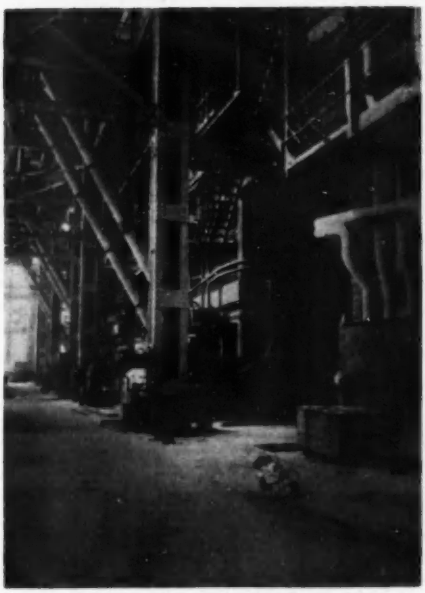
Switchgear

All the main switching is carried out at 66 kV, the generators being connected to the 66kV system through 25 MVA outdoor transformers. Auxiliary power is taken from the system via two 4,500 kW oil-cooled transformers and is stepped down to 3·3 kV for the larger auxiliary motors. Lower voltage supplies are provided by three 550 kVA 3,300/416 V transformers.

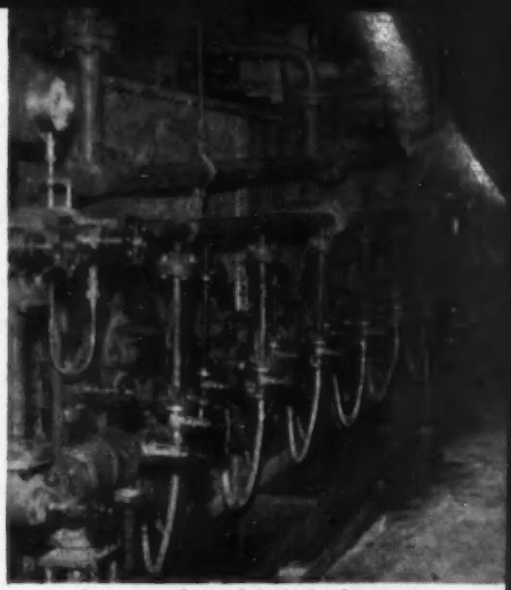
The main switchgear, of the outdoor, duplicate busbar, bulk-oil type, is in a compound at the landward side of the station and has a rupturing capacity of 750 MVA. The 3·3 kV switchgear is single-busbar, air-insulated air-break type and has a rupturing capacity of 150 MVA, while the 415 V distribution fuse boards are fitted with h.r.c. fuses rated at 25 MVA. All main power cables are paper-insulated lead-covered and armoured with the exception of a single core which are of course unarmoured. D.C. supplies are provided by a 220 V 240 Ah lead-acid sealed-cell type of battery.

Transmission

A 66 kV double-circuit line to Bungsar connects Connaught Bridge to the main system. This line is 22 miles long. The increased capacity and loading on the system due to the Connaught Bridge station has, however, meant considerable modification and rearrangement of the 11 kV and 33 kV switchgear and the control equipment at Bungsar. This includes an increase in the capacity of the 11 kV busbars, new 11 and 33 kV switchgear, new 11/33 kV transformers, new control switchboards for the 66 kV substation and a new synchronous condenser to give 8,500 kVA at zero p.f. loading.



The boiler firing aisle showing Nos. 2, 3 and 4 units fitted for coal burning



A view of the rear of one of the boiler furnaces to show the oil burners and their pipe lines

Our thanks are due to Preece, Cardew and Rider for the information given in this article and for the heading photograph. The other pictures were lent by Babcock and Wilcox.

PRINCIPAL CONTRACTORS

Turbo-alternators ...	C. A. Parsons.
Boilers	Babcock and Wilcox.
Economisers	E. Green.
Steelwork	Redpath Brown.
Water Valves	Blakeborough.
Steam Valves	Dewrance.
Deaerator	Hick Hargreaves.
Fans	Davidson and Co.
Motors	Lancashire Dynamo and Crypto.
Diesel Alternator	Harland and Wolff.
C.W. Pumps & Feed Pumps	Mather and Platt.
Sync. Condenser	B.T.H.
Main & Aux. Switchgear	B.T.H.
Cables	Siemens.
Arc Suppression Coils ...	Hackbridge and Hewittic and English Electric.
Lighting and Telephones...	G.E.C.
Batteries	Chloride Batteries, Ltd.
Fuel Oil Tanks	Whessoe.
Fuel Oil Pumps	Stothert and Pitt.
Fuel Pipes	Stewart and Lloyds.
Transmission Line ...	B.I.C.C.

Other items were supplied by Yorkshire Copper Works, Caird and Raynor, Ledward and Beckett, Brown Boveri, and Brookhirst Switchgear.

PROPERTIES OF INSULATING MATERIALS

I.E.E. Symposium Covers Recent Work on Solid and Liquid Insulants Together with Researches on Newly Developed Plastic Laminates

MATERIAL sufficient for numerous textbooks was provided in the papers and their associated discussions presented at a Measurements Section Symposium, held at the I.E.E. last week. This symposium covered the whole field of dielectric and insulation measurement, ranging from the researches of the physicist, interested mainly in deriving and verifying theories of molecular orientation, to the power engineer concerned with the quality of ten-year-old oil in a large transformer.

Insulating Oils

The first paper of interest in the power field was that by Childs and Stannett of the B.E.A. laboratories[7], who gave an account of a survey carried out on 66 oil samples from grid and generator transformers with ages ranging between 1 and 24 years. The ratio of grid to generator transformers was 3:1 and the properties of the oil measured were resistivity, acidity and total iron content. This particular paper utilised statistical methods to correlate these variables and, after a fairly lengthy general analysis, it was concluded that hydrocarbon oil could be expected to have a life of about 35 years for a limit of acidity of 1·0 mg KOH/gram in large transformers. It was found that iron contamination occurred mainly in generator transformers where the oil had been in service between 1 and 8 years. This was, however, only a danger if it accelerated oxidation and sludge formation. A certain amount of doubt was also expressed on the economic and practical soundness of using chlorinated aromatic fluids to operate at higher temperatures due both to cost and the tendency to hydrochloric acid formation if sparking or arcing occurred through them.

J. Dunkley[8] dealt with some measurements (again over the frequency range of 50 c/s to 30 Mc/s on very pure paraffinic oil) and on the same oil containing a minute proportion of di-2-ethyl hexyl-phthalate and showed that the effect of humidity was nil on the pure oil but produced a serious low frequency loss on the oil containing the ester. This loss was proportional to the square root of the ester content and increased rapidly as the voltage was raised from 2 to 10 kV/cm.

The measurement of power factors of insulating oils at 50 c/s was dealt with by Martin and Patterson[9] who emphasised the difficulties of using standard instruments to carry out measurements of the order of 0·00005 or less. They had, however, developed an instrument—a modified Schering bridge—and designed auxilary equipment which would enable the power factor of an oil to be measured with an error of approximately $\pm$ 3% $\pm$ 0·000015. The great advantages of this equipment are its consistency of performance and the fact that it can be used for routine testing with accuracy and ease.

Another slant on the same problem[11] was given by Stark who attributed the reason for the considerable discrepancies in dielectric loss measurements made by various laboratories, to the contamination of the oil with impurities or to the instability of the oil. For example, oxidation can cause the dielectric loss of an oil sample to fall to a small fraction of its initial value in the time taken by some test cells to attain thermal equilibrium at 109° C. The paper, therefore, dealt with a technique for cleaning and handling the main British and American test cells so as to avoid the possibility of contamination. It was, however, thought that if different laboratories, using identical equipment, were to measure the loss angle of similar oil at 109° C, the oxidation function would affect the results so that a difference factor of 4:1 might be obtained. Thus not much reliance could be placed upon an exact high temperature value of the loss angle of an oil, but only on its order of magnitude.

Pressboard, in conjunction with insulating oils, is widely used in the electrical industry in the construction of transformers and other equipment. Owing, however, to the hydroscopic nature of pressboard, and the fact that transformer oil can hold water in solution, it is quite possible for water to be absorbed by the pressboard under normal service condi-

tions. Work has been carried out to determine more quantitatively the effects of water on the loss tangent, permittivity and electric strength of pressboard, and the results were given in the paper by Rushall[10]. Taking moisture-free oil-soaked pressboard first, it was noted that the dielectric properties were not appreciably impaired by heating the material to 90° C. Moisture, however, added to the loss tangent of the dry material, a component which increased exponentially both with temperature and (above 4% moisture) with moisture content. Somewhat similar relationships were obtained for the permittivity of the material.

No appreciable reduction in the 20° C breakdown voltage was noted with moisture contents up to 4%. At 90° C, however, the breakdown voltage was markedly reduced by 2% moisture and was reduced to one half of the normal dry value by 4% moisture. As the tests were carried out on pressboard in which the moisture was uniformly distributed before oil impregnation, a warning was given that the results could be considerably modified by inequality in the distribution of moisture, a condition likely to arise if the moisture were absorbed after oil

PAPERS AT THE SYMPOSIUM ON INSULATING MATERIALS

Ref. No.	Author(s)	Title of Paper	Firm or Establishment
1.	W. Culshaw	"A Spectrometer for Millimetre Wavelengths"	T.R.E.
2.	A. Fairweather, E. J. Frost	"Dielectric Behaviour of Granular Semi-Conducting Aggregates with Special Reference to Some Magnesium Ferrites"	P.O.
3.	L. Hartshorn, J. V. Parry, E. Rushton	"The Dielectric Losses in Some Representative Insulating Materials"	N.P.L.
4.	A. C. Lynch	"Variation of Capacitance with Temperature in Metallised-Mica Capacitors"	P.O.
5.	R. H. Norman	"The Dielectric Properties of Rubber"	British Rubber Manufacturers
6.	A. Turney	"The Dielectric Properties of Certain Benzene Derivatives in the Solid State"	E.R.A.
7.	D. G. Childs, A. W. Stannett	"Some Aspects of the Deterioration of Insulating Fluids"	B.E.A. Research
8.	J. Dunkley, R. W. Sillars	"The Effect of Humid Air on Power Loss in Pure and Impure Paraffin Oil"	M.V.
9.	R. G. Martin, E. A. Patterson	"The Measurement of the Power Factors of Insulating Oils at 50 c/s"	Shell Petroleum
10.	R. T. Rushall	"Dielectric Properties of Oil Soaked Pressboard as Affected by Water"	B.T.H.
11.	K. H. Stark	"Dielectric Loss of Insulating Oil"	E.R.A.
12.	J. H. Calderwood, R. Cooper, A. A. Wallace	"An Experimental Investigation of Factors Influencing the Electric Strength of Potassium Chloride Crystals"	Liverpool University
13.	H. F. Church, C. G. Garton	"Some Mechanisms of Insulation Failure"	E.R.A.
14.	E. Friedlander, J. R. Reed	"Electrical Discharges in High-Voltage Equipment"	G.E.C.
15.	W. L. Harries	"The Electrical Breakdown of Air Between Insulators"	Clarendon Lab., Oxford
16.	J. B. Higham, P. K. Watson	"Electric Breakdown of Transformer Oil"	E.E. and University of Birmingham
17.	D. Leader	"Electrical Breakdown in Vacuum"	Shell
18.	T. J. Lewis	"Electrical Breakdown in Organic Liquids"	Queen Mary College
19.	J. H. Mason	"Breakdown of Insulation by Discharges"	E.R.A.
20.	H. G. Riddlestone	"The A.C. Breakdown of Polythene and Polystyrene"	E.R.A.
21.	B. Salvage	"The Impulse Breakdown of High-Voltage Cables of the Solid and Gas-Cushion Types"	W. T. Henley's
22.	A. N. Hawthorn, S. W. Messent	"The Properties of Some of the Newer Laminated Plastic Insulating Materials"	Micanite and Insulators
23.	H. R. Heap	"Recent Development in the Testing of Insulating Varnishes"	Crompton Parkinson
24.	E. Jones	"Insulation of Rotating Electrical Machinery"	English Electric
25.	R. Newbound, R. T. Rushall	"Comparative Observations on Thermo-setting and Oxidising Varnishes Used as Impregnants under Oil"	B.T.H.
26.	P. Popper	"Ceramic Dielectrics and their Application to Capacitors for Use in Electronic Equipment"	Mullard Ltd.
27.	W. J. Renwick, J. R. Reed	"Silicone Resins, Fluids and Elastomers in Insulation for Use at Power Frequencies"	G.E.C.
28.	W. G. Robinson, E. C. Bloor	"A Survey of Electrical Ceramics"	Bullers Ltd. Taylor Tunnicliff
29.	H. B. Slade	"High Voltage Rubber-Insulated Submarine Cables"	Okonite Co. (U.S.A.)
30.	G. Mole	"Improved Methods of Test for the Insulation of Electrical Equipment"	E.R.A.
31.	H. E. Rees, F. S. Edwards	"Variations in the Electric Strength of Some Industrial Insulating Materials"	M.V.
32.	V. E. Yarsley, G. E. Ives	"Testing Insulating Materials for Susceptibility to Tracking"	V. E. Yarsley (Research Labs.) Ltd.

impregnation, and this fact should be taken into consideration when applying loss tangent measurements to prove the presence of moisture in applied insulation of this class.

Electric Strength and Breakdown

The first of the papers in the section dealing with electric strength and breakdown measurements[12] was by Calderwood, Cooper and Wallace who detailed some work carried out on potassium chloride crystals. Although no practical applications of the alkali halide crystals exist, they are yet of importance as they can be used to verify quantitively, theoretical predictions of their electrical characteristics. The work outlined broke new ground in that it demonstrated the profound influence of residual strains, caused by plastic deformation on the electrical strength. So far as is known, previous workers in the field have not considered this matter sufficiently, and it is suggested that great care should be taken to ensure that future measurements of electric strength should be carried out on strain-free crystals in order to maintain consistent results.

Insulation failure, that bugbear of the electrical engineer, was considered in all its forms by Church and Garton.[13] The whole subject was most complex as failure was the result of many effects. In solid insulation these could be divided into; intrinsic (or electronic breakdown), thermal instability, erosion by gaseous ionic bombardment, electrochemical deterioration and chemical deterioration. Further possibilities, for which evidence was accumulating but which were not yet fully established were: rapid penetration of gaseous discharges into solids at high stresses, and electronic bombardment in impregnated insulation.

A remarkable example of failure quoted in the paper was that of breakdown of polystyrene film used as a dielectric in capacitors. This film is stretched during manufacture both longitudinally and transversely so that the molecular chains of the plastic lie predominantly in the film plane. At normal temperature the film remains "frozen," but at about 90-100° C, the orientation relaxes and the film greatly contracts and becomes thicker. This phenomenon is used to eliminate voids in the capacitor. It was, however, found that electrical failure was occurring after the heat treatment. Careful investigation ultimately showed that these failures were due to specks of oil on the film which relaxed the molecules locally in advance of the remainder, the residual forces being then sufficient to cause tearing and pinholing. Further research showed that this oil came from dandruff particles!

Several other investigations were detailed and attention was drawn to the wide gap between intrinsic electric strengths and average working stresses. The highest stresses now used in cables could not be greatly increased if a margin of strength had to be left to meet impulse conditions. If a substantially higher working stress became possible, it might be economic to prevent surges entering the cable.

Air Gap Discharges

Questions of electrical discharges through air gaps and insulation in series were raised by Friedlander and Reed.[14] The main accent was on the phenomena which occurred at the end windings of high-voltage alternators under heavy over-voltage tests. One of the most critical regions in the insulation of these machines was the point where the conductors emerged from the slot. During a pressure test on a machine with only one phase energised and the others earthed, it was noticed that there was an unexplained difference in appearance between the discharge from the conductor to the earthed metal of the clamping fingers between the slots and the discharge between phase coils, which had a much closer spacing. Although the voltages across these spaces were approximately equal, the discharges between phase coils were much less intense, only a mild bluish glow being visible. No highly luminous or loud crackling streamer discharges of the kind emanating from the pressure fingers could be observed.

By way of experiment, a piece of 0.04 in. thick Micanite was moulded over each pressure finger, and this eliminated all crackling discharges and indicated that, if insulation were so arranged that no bare metal was available to permit the formation of "foot points" for the streamers, the overall strength of the gap might be increased despite the increased electric stress in the air. Laboratory tests indicated that the short-time breakdown strength of the machine had been increased by about 30%. In consequence of this finding, an investigation was set on foot, the results of which were given in the paper. Two further phenomena were also considered: the increase of discharge current with rising voltage, and the origin of the long discharge free range in the decaying part of alternating voltages. The basic theory derived, considered the responsible agents to be the loss of some of the surface charges left from earlier discharges, due to local reversals of the electric field. More experimental evidence was, however, required for complete clarification of the processes involved.

Similar conclusions were also derived by Harries[15] who showed that the a.c. breakdown

current in a glass vessel with external electrodes containing air at reduced pressures, consisted of a number of separate pulses, the number in a half cycle increasing with the excess voltage. The current flowed in pulses because once a breakdown had occurred in the gas, charges collected on the glass walls and produced reverse fields which stopped the discharge. These wall fields also determined the phase when the pulses occurred. Ionisation by collision of the molecules of gas and secondary emission of electrons from the inner surfaces of the glass walls were also fundamental processes in the discharge. It should be emphasised that these conclusions were somewhat restricted due to the fact that they were derived from experiments carried out in the range 8 to 200 mm Hg. and also because the charge phenomena on glass are much different from those occurring on conductors.

Cavitation

The breakdown mechanism in transformer oil is also dependent on experimental conditions and many of the considerations relating to loss measurement and power factor are equally applicable.[7 9 10] The paper by Watson and Higham,[16] for example, suggested that while the divergence in experimental results reported for apparently similar conditions had led to suggestions of numerous breakdown mechanisms, these diverse results could possibly have been eliminated by extremely careful control of experimental conditions. In the past, the suggestion had been put forward that a cavitation mechanism might be responsible for some part of the breakdown mechanism, bubbles forming either from gas in solution in the liquid or by local vaporisation of the liquid itself. A method of discriminating any cavitation phenomena from other methods of breakdown was to study the effect of hydrostatic pressure. Accordingly special equipment was built to provide pressures up to 500 lb/sq in. It was concluded that under certain circumstances cavitation did play a part in breakdown, but more work on this subject was necessary.

Breakdown in vacuum and in organic liquids was dealt with by Leader[17] and Lewis,[18] and further experiments on polythene and polystyrene were recounted by Mason[19] and Riddlestone.[20]

The final paper of the session by Salvage[21] was devoted to the impulse breakdown of high-voltage cables of the solid and gas cushion type. The experiments detailed used a Marx type impulse generator with an open-circuit maximum output voltage of 1,170 kV and a total energy of 17 kW/secs. It was concluded that the impulse strength of both types of cable was about 1,000 kV/cm and was practically independent of the insulation thickness, the conductor size, and, in the case of the gas-cushion type, of the gas pressure.

Newer Insulants

New fillers and synthetic materials mainly in the form of laminated plastics were described and compared by Hawthorn and Messent[22] in the session devoted to general properties and current problems. Some eleven materials including laminated papers, glass-phenol, Terylene-phenol, nylon-phenol, acetylated cotton-phenol, glass-melamine and glass-silicone were dealt with.

Heap[23] described some suggested methods of testing impregnating varnishes, and Jones[24] in his paper discussed the use of new or improved materials particularly the new laminates, in rotating machines. Varnishes were also the subject chosen by Newbound and Rushall[25] who compared the properties of thermosetting and oxidising varnishes used under oil. They concluded that thermosetting varnishes were particularly suitable for the treatment of windings to be used in oil, although certain practical difficulties arose in their application. Ceramic dielectrics for use in capacitors in electronic equipment formed the subject of Popper's paper,[26] while a review of the use of silicones[27] in electrical insulation together with operating experience in this field up to the present was given by Renwick and Reed. A further survey,[28] this time in the ceramic field, was provided by Robinson and Bloor, and the final paper dealt with high-voltage rubber-insulated submarine cables.[29]

Specification and Testing

The problem of testing insulation so as to obtain evidence of deterioration before complete breakdown occurs is of great importance. To date many methods used are limited in application. Mole[30] described a direct-reading portable instrument—a dispersion meter—for use in the field in order to detect moisture in paper insulation, and also a portable a.c. discharge detector for locating voids in which minute discharges may be taking place.

The wide variations in the measured strength of industrial insulating materials were again considered[31] by Rees and Edwards, who found that coefficients of variation of 10% on the same specimen were often exceeded.

Finally, Yarsley and Ives dealt with the phenomenon of tracking, and put forward a proposed standard method of test.

Economies in Wiring

Some Ministry Suggestions Questioned at I.E.E. Discussion

LAST July the Ministry of Works published a report* which suggested ways in which materials such as copper and steel might be conserved in wiring installations. These suggestions provided the basis for a well-attended discussion meeting of the I.E.E. Utilisation Section held last Thursday, at which three speakers presented their own views on the recommendations, and other members dealt with individual points.

The opening speaker was Mr. Forbes Jackson (L.C.C.), who developed the theme that whilst everyone agrees that economy in material is a basic requirement of good engineering, it is fair to point out that the quantity of copper and steel used in electrical installation is small compared with that used (often unnecessarily) by other building trades. Probably the carpenter used more steel in nails in a three bedroom house than was used as electrical conduit.

If copper is saved, then the I^2R losses increase, and coal, another commodity in short supply, is wasted. Diversity factors allowed in the I.E.E. wiring rules already give the designer a great deal of latitude in the choice of cable sizes, and thus it can be argued that the Ministry's recommendations concerning conductor ratings would not save copper in comparison with design to existing regulations.

Mr. A. V. Milton, the next speaker, agreed that for the economical use of raw materials the installation engineer must design to closer limits, but relaxation of good practice must be avoided. Duplication of protection should be dropped, and full advantage taken of the establishment of single tariffs by using single distribution systems. A major but important matter was the need for systematisation of scrap recovery on installation jobs.

Uneconomic Design

Last to speak of the opening trio was Mr. P. McKearney (Ministry of Works), who stressed that the purpose of economising in materials is to enable more installations to be completed with available supplies. Waste in carrying out an installation can be checked by effective supervision; uneconomic design is more difficult to detect, and this emphasises the need for the designer to have details as complete as possible concerning the use to which an installation will be put. In particular, such data is essential for the proper estimation of diversity factor.

Several subsequent speakers in the discussion took up the point about more careful design work being needed to secure economies in materials. The general argument suggested that the electrical engineer is given insufficient time to carry out his part of the overall design of a building. The architect and the civil engineer have a much longer period to complete their planning, and thereupon expect the electrical engineer to produce his estimate almost at once. The result is that a margin is left for safety in case anything has been overlooked in the comparative rush, and materials are thus wasted.

Other speakers warned against securing savings in materials at the expense of increased labour costs. Examples quoted included small fittings, with terminals that are adequate from the current-carrying viewpoint, but are too small to wire speedily in dark corners.

Light Gauge Conduit

Something of a disagreement showed about the use of grip conduit and other forms of light gauge tubing which Mr. Forbes Jackson had recommended for certain purposes. It was suggested that the necessary higher standard of supervision when this is used in reinforced concrete buildings make it uneconomical, but much evidence was quoted on the other side, with long life histories of freedom from trouble.

One speaker asked why we should not revert to single strand conductors, while another was disappointed that there had been no mention of the use of modern systems of conduit which required no steel. It was suggested that it might be possible to save something by not relying on the conduit as an earth continuity conductor. Experiences in Nigeria lightened the discussion at another stage, the speaker mentioning that ample size could be an advantage for installation in the tropics.

* *Economics in Building Materials. H.M.S.O. price 2s.*

Electricity Supply Handbook 1953

Maps and text have been completely revised for the new edition of this publication. Standard tariffs, voltages of towns, and supply statistics are given as well as the principal feature, personnel of the industry. Price 5s., from the ELECTRICAL TIMES offices.

M.E.M. Extensions

New Buildings and Rearrangement to Speed Production

THE Midland Electric Manufacturing Co., known throughout the industry as M.E.M., are in the enviable position of making practically all the components used in their switchgear in their one factory at Tyseley, Birmingham. The post-war demand for switchgear, motor-starters, plugs and sockets, etc., proved so great that intensive production studies, reorganisation and rebuilding have had to be carried out to enable this factory to be operated with the utmost speed and efficiency, yet at the same time to keep up the traditional quality of the product with reasonable price levels.

The main frontage building of the factory has now been completed, and although the administrative and executive sections of the block are not yet finished, the actual manufacturing part has been working for some time.

Particular care has always been taken in these works to provide, as far as possible, optimum working conditions for the employees and even the automatic foundry is a clean, well-lighted and well-painted shop. In the pottery section, where porcelains for switch bases, fuse carriers, fuse sockets and other items are made, a comprehensive system of air-conditioning has been introduced to extract the dust unavoidable in this type of work.

Opportunity has been taken in the reorganisation to establish a comprehensive test section where life testing under various conditions of use can be carried out by automatic machines. This permits full control to be exercised on the quality of the factory output.

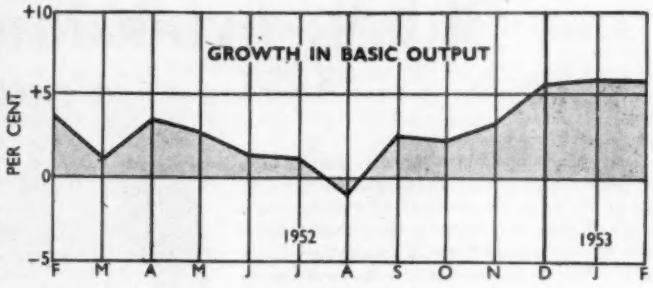
Apart from their well-known range of M.E.M. switches and switchgear, the firm has now recommenced the manufacture of electric fires, available in 1 and 2 kW sizes and is developing high-rated switch fusegear of the Glasgow-Rex type for current ratings in excess of 200 amps at 500 volts.

A visit we paid recently to the works proved singularly refreshing, not only due to the excellent conditions within the shops but also to the really hard work that was being done by all employees—a marked contrast to many of the moans which claim that the British workman has lost the capacity for work.

The new building shown at the top, centre is a view of a section of the main works devoted to the production of small components and below is the new laboratory replacing the original one destroyed in the war

BASIC LOAD GROWTH

The accompanying curve shows how the energy sold by the B.E.A. in the past 12 months has compared with that of the corresponding month a year earlier. The figures used for plotting are first corrected for the effects of temperature and for the number of working days included in the calendar month. Thus the points marked are an approximate measure of the basic rate of load growth that is being experienced by the B.E.A.



Power Supply in February

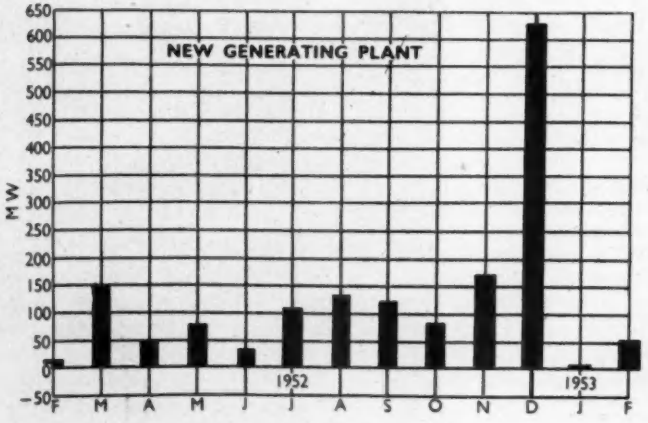
LAST month saw but a small increase in the generating capacity of the B.E.A., only one set being commissioned. Installed at Brighton 'B' power station, this is the second 52·5 kW turbo-alternator set to be commissioned in that station and, like the previous set, is of Richardsons Westgarth manufacture. Sets at this station are supplied from Babcock and Wilcox boilers, each supplying 320 k lb/hr of steam, at 900 lb/sq in., 900° F., at t.s.v. as described briefly in our issue of March 12. So far only two boilers have been commissioned. The commissioning of this set increases the total installed capacity of the Authority from 17,185 MW in January to 17,237 MW, whilst that of the North of Scotland Hydro-Electric Board remains at 560 MW.

Sales

Although total B.E.A. sales have increased by only 0·6% over the corresponding month in 1952, corrections for temperature and working days give a figure of 5·9% as the increase in basic output. This year slightly warmer climatic conditions prevailed, the average tem-

B.E.A. SALES TO AREA BOARDS IN FEBRUARY

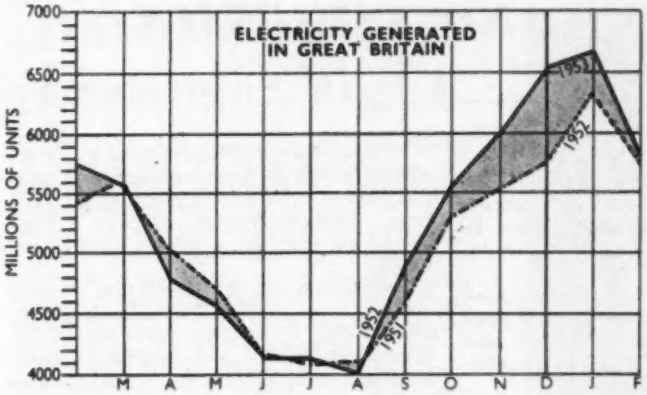
Board	Feb. total in million units	% inc. or dec. on Feb. 1952
London	552·8	+1·1
South Eastern ...	312·1	+2·5
Southern	362·3	+6·0
South Western ...	171·2	+4·7
Eastern	496·3	+3·2
East Midlands ...	412·0	+2·6
Midlands	551·5	−0·1
South Wales	278·2	+0·8
Merseyside and N.W.	294·3	−6·1
Yorkshire	521·1	+1·0
North Eastern ...	304·4	−4·1
North Western ...	584·6	−2·2
S.E. Scotland ...	112·4	−2·6
S.W. Scotland ...	278·2	−0·6
Direct Sales	68·3	+9·8
Grand Total ...	5,299·7	+0·6



GENERATING PLANT

At the end of February, 1953, the installed capacity of the B.E.A. was 17,237 MW, showing an increase of 52 MW during the month. During this same period the North of Scotland H.-E. Board total remained constant at 560 MW. The month's commissioning figures bring the overall increase during the past twelve months to 1,525 MW, or 9·4% of the total at the end of February, 1952.

The total installed capacity used for the purposes of this graph is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides and are suitable for service.



UNITS GENERATED

5,802 million units was the total generated during February in stations under the control of the B.E.A. and the North of Scotland H.-E. Board. The corresponding figure last year was 5,752 million units.

Of the total, 5,677 million units was generated in steam stations and 110 million units in hydro-electric.

Energy sent out during the month was 5,472 million units, 94·3% of that generated.

perature for February being 41·8° F. compared with 40·5° F. last year; and in areas where consumers are predominantly non-industrial, boards' sales reflect this to some extent, although all bar one show increases over the previous year's figures.

There were, however, fewer effective working days last month, resulting in generally lower sales by boards serving predominantly industrial consumers. Out of eight such boards, only three show sales increases, and these are comparatively small compared with decreases experienced by the remaining five. Sales by these boards were 0·9% less than in February 1952, whereas sales by boards in non-industrial areas rose by 2·8%. In absolute figures these amount to 3,224 million kW/hr and 2,007 million kW/hr respectively, making a total, including direct sales by the Authority, of 5,300 million units sold in February.

As will be seen from the graph, the growth in basic output has now remained at over 5% for the last three months. This is an encouraging sign, showing that the rate of increase is tending towards a more normal figure after the recession in demand which has been experienced by the industry late in 1951 and for much of 1952. Reflected in this curve is the happier position of the textile industry, and increasing demands from large, new industrial consumers, including an oil refinery and steel works.

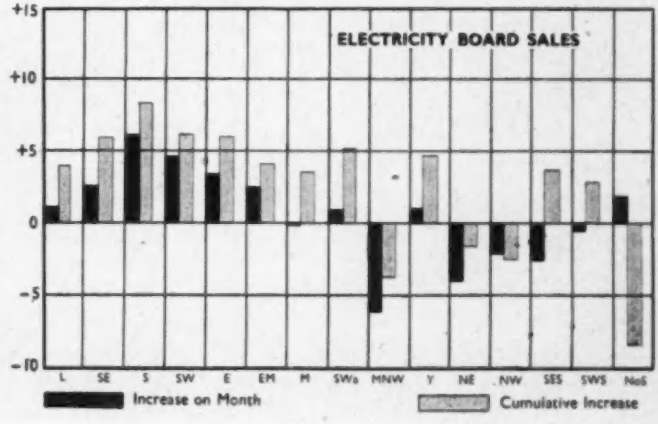
Coal Position

Overall coal stocks in power stations during February were a little above those 12 months earlier, averaging 4·86 tons each week throughout the month. Nationally the position is reversed, stocks having decreased by a small amount. Coal consumption has also increased, from an average of 804,000 tons/wk. in February 1952 to 830,000 tons/wk. last month.

FEBRUARY SALES

Progress in the sales of energy by the British Electricity area boards and by the North of Scotland H.-E. Board are represented in the accompanying diagram. The two columns for each entry indicate, respectively, the bulk supply of electricity (or the total generation, for the North of Scotland) taken in February, 1953, as a percentage increase on the corresponding 1952 figure; and the same comparison for the cumulative totals based on the financial year.

It should be noted that the B.E.A. financial year runs from April 1, while that of the North of Scotland H.E. Board corresponds with the calendar year.



PROBLEMS AND PRACTICE in Engineering

Open Neutral

I SHOULD like to point out a peculiar fault which we experienced on our domestic supply voltage this week, which should be very useful to supply authorities' maintenance engineers.

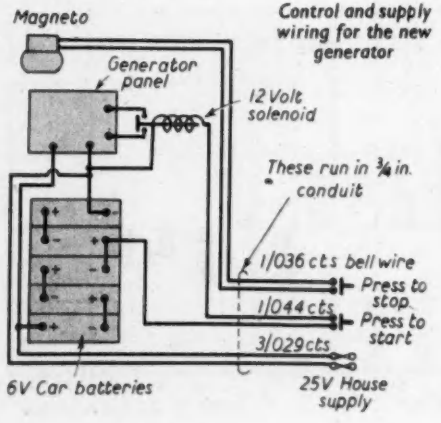
The supply voltage suddenly increased from 240 to 350 volts, but when a load of 100 watts was put on, the voltage dropped to 330, and subsequently dropped 20 volts as each additional load of 100 watts was put on.

The fault was caused by the open circuit of the main supply neutral conductor (supply is 3 phase, 4 wire), putting me and other consumers across two lines of the supply whilst the potential of the neutral floated to a voltage determined by the relative values of the consumers' loads.—*R. Wainwright.*

Changing Generators

WHEN called upon to change a 230 V generator for a 25 V generator with batteries and stop-start panel, I found the following difficulties.

The generator was in an outhouse and connected to the house through ¾ in. conduit, installed under a lawn, which could not be cut up to lay a larger conduit. The new generator was motored with a supply from the batteries for starting. This would require a 7/064 cable between the house and outhouse, which obviously could not be accommodated in the ¾ in. conduit.

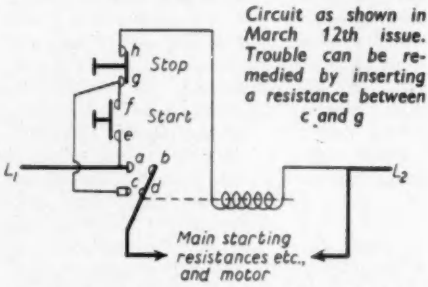


To overcome the difficulty I fitted a 12 V car solenoid across the appropriate generator panel connections. This was energised with a 12 V supply from the batteries, installing a 1/044 connection with the stop-start panel in the house.

For the magneto stop connection I used a 1/036 c.t.s. bell wire and for the house lighting a 3/029 c.t.s. These three cables were drawn into the ¾ in. conduit and connected as shown in the accompanying diagram. The set has been giving satisfactory service now for several years.—*W. S.*

Poor Contacts

A SIMPLE remedy for the troubles which your correspondent is experiencing with the d.c. contactor described under the above heading, is the insertion of a resistance in the



Circuit as shown in March 12th issue. Trouble can be remedied by inserting a resistance between c and g

connection between the terminals c and g. The hold-in current for a d.c. contactor can be considerably less than that required to pull in, and thus insertion of the resistance would not prevent the coil from holding in, but it would definitely prevent any overloading of the contacts e and f.

The minimum hold-in current can be readily obtained by fitting an adjustable resistance and ammeter between c and g, and increasing the resistance until the contactor only just holds in. From the observation of the current then passing through the coil and that passing with no external resistance in circuit the maximum value of the external resistance permissible could be readily calculated. It would be wise to insert a resistance of a somewhat smaller value than this calculated value, to allow for any mains voltage variation.—*R. A.*

Batti-Wallahs' Ladies' Night

SPEECHES were short and witty after dinner when the Batti-Wallahs' Society held its annual Ladies' Night last week under the chairmanship of the President, Mr. J. W. Perkins. Col. H. J Wellingham proposed the toast "The President and his Lady," and after Mr. Perkins had responded in poetic vein, the traditional "Sweethearts and Wives" was ably dealt with by Rear-Admiral (L) C. P. Clarke. To this a charming reply was made by Miss Ann Perkins.

Seen below are (1) Messrs. J. L. Rowbotham, F. S. Smith, and T. C. Bigland (Mr. Mate) with Miss Smith, Mrs. Smith, and Mrs. Bigland, (2) Sir John Dalton and Sir Montague Hughman, with Lady Dalton, (3) Sir John Hacking and Mr. E. R. Wilkinson, and their ladies (4) Messrs. J. E. Daymond, T. C. Cleland and C. B. Cleland with their respective ladies.

The President and his lady—Mr. and Mrs. J. W. Perkins pictured at the reception

1

2

overseas news

Gas Turbine Set

The first gas turbine electricity generating unit to be installed in Canada is expected to go into operation at the Vermilion plant, Alberta, of the Canadian Utilities, Ltd., in the summer of 1954. This new 7,000 kW unit, while the first of its kind in Canada, will not be experimental, for several sets have been installed—it is being made by Brown-Boveri Ltd., in Switzerland. Cost of the unit is put at $560,000, and including installation costs, about $620,000. Its addition will almost double the capacity of the present natural-gas-fired steam plant at Vermilion. It is considered that in such areas as this where there is a plentiful supply of natural gas, these gas turbine generators may become strongly competitive to the normal thermal stations for regions where water power schemes would not be economical.

Manitoba's Records

A record increase of 22·8% in units sold was registered by the Manitoba Power Commission during the year ended March 31, 1952, according to the annual report. Operating income and expenses were both records also, but the resulting net profit of $40,143 was 9% lower than for the previous year. During the year a further 8,514 consumers were connected, making the total number of consumers 77,322. Mr. W. D. Fallis, general manager, reports that the volume of electrical appliance sales was at a high level.

N.S. Plant

Work on a new $2·5 million hydro-electric power development has been started by Nova Scotia Light and Power Co. To be located on the Nictaux River, the plant will have a capacity of 9,000 h.p., and will operate under a 400 ft head. It will be connected with the 5,000 h.p. Paradise River development which was completed about two years ago. It is hoped that this new project will be in operation in the winter of 1954.

Ontario Developments

Three of the four projects now under construction to increase the generating capacity of the Hydro-Electric Power Commission of Ontario are scheduled to be completed this year. These are the two steam stations—the Richard L. Hearn at Toronto and the J. Clark Keith at Windsor—and the Otto Holden generating station on the Ottawa River, where the eighth and final set is nearing completion, making the installed capacity of that station 273,000 h.p. At the Sir Adam Beck Niagara station No. 2, work is continuing at an accelerated rate to bring the first four 100,000 h.p. units into service in 1954. Six more similar sets are scheduled for service in 1955 and the final two in 1956. The Commission also intends to add to its transmission system this year by completing interconnections between its Southern Ontario system and the Detroit Edison Co. at Sarnia and Windsor.

Italy's Railway Plans

Plans for the electrification and improvement of several rail routes of the Italian State Railways have been approved by the Administrative Council of the Railways. Work is to begin immediately on the scheme, which is estimated to cost about 5,000 million lire. One important project in the scheme is the electrification of the line between Bologna and Venice at a cost of about 1,515 million lire, while further sums amounting to 1,880 million lire have been earmarked for various stages of the Palermo-Messina electrification plan.

Another French Scheme

Work on a new dam for another hydro-electric scheme on the River Rhone, was inaugurated by M. Mayer, the French Prime Minister, last week-end. The dam is being constructed at Rochemaure, near Montelimar, a few miles upstream from the Donzere-Mondragon project which was put into operation last October. The plant will utilise a head of 58 ft., and will produce 1,600 million kWh annually, it is estimated. Cost of the project is put at 60,000 million francs.

Scheme for Zanzibar

A £250,000 scheme to modernise the electricity supply undertaking in Zanzibar is now being carried out by the Zanzibar Government. Some of the machinery in the existing diesel power station is about 40 years old, and replacement is overdue. The present scheme provides for the erection of a new power station near Saarteni and the conversion of the distribution system from d.c. to 230 V a.c. Along with this latter work, much of the cable is now being placed underground. It is hoped that the new station and distribution system will be in operation by the middle of next year, meanwhile the Government has prepared a scheme providing for the payment of compensation where consumers' apparatus cannot be converted for use on the new system.

Act Amendments Proposed

For some time now various electricity undertakings in India have been seeking changes in the Electricity (Supply) Act. But now that it appears unlikely that an amending Bill will figure in the forthcoming session of Parliament, the Federation of Electricity Undertakings of India

has suggested to the Government that a brief measure embodying urgent proposed amendments to the Act might be considered. The Federation proposals include clarification of the undertakings' rights to adjust their tariffs, and an increase from 5% to 6% in the standard rate of profit allowed.

Pakistan Development

On the further electrical development of Pakistan, much now depends on the result of talks now going on between Canadian experts and officials of the World Bank. The immediate hydro-electric schemes in mind are the Warsak and the Karnafuli projects, for which M.R.V. (Pakistan) are the consultants. Following local investigation, the Canadian experts are apparently favourably impressed with the Warsak scheme and it seems likely that they will offer some help for the Karnafuli project. The Central and North West Frontier Province governments are both anxious to go ahead with the Warsak scheme, but tenders cannot be called for till the Canadian Government has decided how much equipment and other forms of aid, if any, it is prepared to supply under the Colombo Plan. Under present plans for the Warsak scheme the generating capacity of the first stage would be 150 MW, and the ultimate capacity 180 MW. The machinery hall of the station itself would be underground, on the right hand bank of the gorge, while the dam is to be rock filled with a core of impermeable clay. Apart from the tunnel leading to the power station, there will be a tunnel 18,000 ft long to carry the water through the hillside to the irrigation canals on the right bank of the Kabul River and another of 8,000 ft for a similar purpose on the left bank.

Other news from Pakistan is that orders are about to be placed for the smaller Kurram Gorhi hydro-electric scheme, the bulk of the equipment for which is to be supplied by German manufacturers, we learn.

Queensland's New Plant

The first "packaged" power plant to go into operation in Queensland was started up at Abermain earlier this month. At the moment only half of the ultimate capacity of 10,000 kW is available. The station has been completed within two years of its original planning by the former City Electric Light Co. It is erected immediately adjacent to the Haighmoor coal mine, from which it obtains its fuel via a 70-ft. rubber belt—the shortest distance from coal mine to power station anywhere in the world, it is claimed. The coal is automatically weighed as it passes along the belt. The plant is American; its purchase was financed from the International Bank's $50 million loan, but the plant was only made available after the U.S. National Production Authority had been persuaded by an Australian Mission to regard the project as a contribution to American defence.

Hopes in Sydney

Sydney County Council, N.S.W., has been urged by two members to reduce its electricity charges. The suggestion was recently made when the report of the general manager on the council's operations for 1952, in which a surplus of £14,038 was anticipated, was under discussion. One member suggested that the price of electricity had increased to a point where it discouraged the use of electric power.

The same day, Mr. Conde, chairman of the New South Wales Electricity Commission, gave hopeful news of the power plant situation. He said a 4,600 kW diesel power station at Brookvale would go into commission this month, and the second of Pyrmont's four 50,000 kW turbo-alternators and the fourth unit at Port Kembla package station would be in operation soon. Other effective help before the heavy winter load commences would come from 5,000 kW diesel plants at Canberra and Parkes, the 25,000 kW package station at Penrith, and at least two of the four units which would make up package stations at Liverpool and Maitland.

Work in Queensland

Electricity developmental works now in progress in Queensland, excluding the Burdekin River scheme, are estimated to cost £39,500,000. This figure was given recently by the Minister, Mr. Riordan. Of this total, the estimated cost of works actually in progress from Rockhampton north, and including the first stage of the fully hydro-electric scheme, was £21,500,000. The figures indicated that 54% of the State's electricity expansion work was taking place from Rockhampton north, where only 20% of Queensland's population was located.

An Alternative Power?

After visiting the site at Lake Leake where it has been suggested to the Electricity Trust of South Australia that a power station should be erected to use, initially, off-cuts from saw mills as fuel, Mr. Playford, the State Premier, has said that waste from the saw mills would provide a considerable amount of fuel for the proposed station but as the demand for electricity developed, outside sources of fuel would be essential. Both coal and oil would involve high transport costs, but the use of atomic power is to be considered.

Another Plan

A new five-year power resources development plan for Japan is scheduled to be drawn up early this year. According to reports to date the plan envisages the installation of a further 5,460 MW by 1957-8 at an estimated cost of 852,900 million yen. In the fiscal year 1953-4 the Japan Electric Power Development Co., established last September, will start construction on nine sites. Already work has begun on eight. The other nine power companies are planning to work on 44 hydro-electric and ten thermal power stations during the same period.

PERSONALITIES

IN THE INDUSTRY

Elected president of the Electrical Power Engineers Association for 1953-54 is **Mr. John Jones,** senior assistant engineer (technical) with the Merseyside and North Wales Electricity Board. Before nationalisation he was on the meter engineering staff of the former North Wales Power Co. He received his technical training with Metropolitan-Vickers Electrical Co., and has had long experience in the meter and light current field. He is also a member of the National Joint Board and the National Joint Advisory Committee for the Electricity Supply Industry.

Mr. J. Jones

Mr. E. Orloff, M.B.E., A.M.I.E.E., of the Continental Division of Metropolitan-Vickers Electrical Export Co., London Office, has retired. He started with the company (then British Westinghouse) in 1909 and was in the Transformer Engineering Department at Trafford Park. After war service he took up a staff appointment on the British Military Mission (Railway Branch), Siberia, in 1918, but rejoined M.V. in 1925, being thereafter associated with the company's export activities.

Mr. J. W. Binsted has been appointed sales manager of the new Transformer Division of Winston Electronics Ltd. He has been with the firm for many years.

The B.B.C. announces that **Mr. C. Duddington** has been appointed engineer in charge of the low-power television transmitting station at Glencairn, near Belfast. Mr. Duddington joined the Corporation in February, 1946, at the Lisnagarvey transmitting station. He transferred to the television service at Alexandra Palace in August, 1950, and has since served at the Sutton Coldfield and Holme Moss Stations, becoming a senior maintenance engineer at the latter station in July, 1952. At the Pontop Pike l.p. television transmitting station, **Mr. J. P. Brett** has been appointed as engineer in charge. He joined the Corporation in 1944 and has since served at Woofferton, Ottringham, Brookmans Park and Holme Moss, where he has been a senior maintenance engineer since July last.

Mr. C. A. J. Martin

Chairman of the newly formed British Steel Castings Research Association is **Mr. F. N. Lloyd,** chairman and managing director of F. H. Lloyd and Co. Ltd. The director of research will be **Mr. J. F. B. Jackson.**

Mr. F. A. Moinet, A.M.I.E.E., district manager at Bury St. Edmunds to the Eastern Electricity Board, who has 27 years' service with that undertaking to his credit, was recently the recipient of a long service award, made on behalf of the Board by **Mr. P. Sidney,** Suffolk sub-area manager.

Crompton Parkinson, Ltd., announce that **Mr. C. A. J. Martin,** G.C., M.C., B.A., A.M.I.E.E., general sales manager of the Plant Division Home Sales; **Mr. M. H. L. Lewis,** M.A.(oxon), assistant to the works director (south); and **Mr. Michael Parkinson,** M.A.(cantab), assistant to the works director (north) have been co-opted to the board of executive directors for a period of one year. Mr. Martin joined the company in 1930 and after war service from 1940-45 rejoined as product sales manager f.h.p. motors, and became general sales manager in 1951. Mr. Lewis joined Crompton Parkinson, Ltd., at Chelmsford in 1947. Later he served at Guiseley under the works director (north) and carried out special duties in all the C.P. works. He was production liaison officer at the Doncaster lamp works until 1950 when he was appointed to his present position. Mr. Michael Parkinson, son of Mr. Albert Parkinson, M.B.E., chairman of Crompton Parkinson, Ltd., joined the company in July, 1950, as a trainee in the production and other engineering departments of the company's works. In 1951 he was a member of the Crompton Parkinson Productivity Team which visited the United States and at the conclusion of the tour he remained for a period of further special experience in the U.S. and Canada. He recently visited Crompton Parkinson factories in Australia and South Africa. Mr. Michael Parkinson was at Cambridge University, obtaining an Honours Degree, Mechanical Sciences Tripos, and from 1948-50 was in commissioned service with R.E.M.E.

Mr. M. H. L. Lewis

Mr. M. Parkinson

Mr. E. A. V. Peckham

Mr. T. D. Woods

Mr. A. T. Haywood

At the recent annual general meeting of the Electrical Wholesalers Federation, **Mr. E. A. V. Peckham,** of G. S. Peckham and Co. Ltd., was elected President of the Federation, for the ensuing year. Mr. Peckham joined the Council in 1949 on the retirement of Mr. C. E. Vines, and served for a year as section councillor of the London and Eastern Section. He was subsequently re-elected as a general councillor. At the same meeting **Mr. T. D. Woods,** of Downes and Davies Ltd., was elected councillor of the North Western Section to follow Mr. W. H. Swain, the retiring President, who has served on the Council for 16 years. (Mr. Woods is the son of Mr. Tom Woods, who was President of the Federation in 1940.) **Mr. A. T. Haywood,** of Electrical Components Ltd., was elected councillor of the Midland Section in succession to Mr. J. M. Hollander, Past President, who is retiring from the Council; and **Mr. J. W. E. Rutherford,** of Adamson and Co. (Tyne) Ltd., was re-elected a general councillor.

Mr. Leslie J. Davies has retired from the post of assistant managing director of Richard Thomas and Baldwins Ltd. on account of age. He is 66. He will, however, remain on the board of the company. He has been succeeded as assistant managing director by **Mr. G. A. Young** (general manager, Ebbw Vale section), who has also been appointed a director of the Steel Company of Wales Ltd. **Mr. Charles G. Gilbertson** has retired from the board of Richard Thomas and Baldwins Ltd. on grounds of ill health.

Mr. C. F. Partridge, B.SC.(ENG.)., M.I.E.E. Head of the Electrical Department in the Birmingham College of Technology, has been elected president of the Birmingham Electric Club in succession to **Mr. G. F. Peirson,** M.I.E.E., M.AMER.I.E.E. At the same meeting **Mr. H. M. Fricke,** B.SC.(ENG.)., M.I.E.E., Birmingham branch manager for Johnson and Phillips Ltd., was elected senior vice-president and **Mr. D. H. Kendon,** B.SC., M.I.E.E., M.I.MECH.E., deputy chairman of the Midland Electricity Board, is now junior vice-president of the Club.

Assistant station superintendent at Tir John power station, South Wales Division of the B.E.A., since March 1949, **Mr. R. Beardsworth,** A.M.I.E.E., has been promoted to station superintendent there. Educated at Mount Pleasant School, Accrington, and at Accrington Grammar School, he was subsequently a student apprentice with Blackstone and Co., Ltd., before joining the construction staff of I.C.I. Ltd. at Buxton. In 1939 he went to Portsmouth as a junior engineer in the Corporation electricity undertaking, ultimately becoming technical assistant there, a post he held till going to Tir John in 1949.

Among those recently elected Fellows of the Royal Society are **Prof. Willis Jackson,** D.SC., D.PHIL., M.I.E.E., Professor of Electrical Engineering at Imperial College of Science and Technology, London, who is shortly joining the Metropolitan-Vickers Electrical Co.; **Mr. A. R. Powell,** research manager to Johnson, Matthey and Co., Ltd.; and **S. C. Curran,** senior lecturer in the Department of Natural Philosophy, Glasgow, who is distinguished for his contributions to electronic counting techniques.

The names of the directors of the newly-formed British Relay Wireless and Television Ltd., have been announced. Chairman is **Sir Robert Renwick,** BT., K.B.E.; managing director is **Major G. H. Martin;** and the others directors are Messrs. **F. B. Duncan, P. J. A. Lachelin,** and **C. O. Stanley.**

Mr. J. H. G. Pearce, of Pearce Signs, has been elected chairman of the Electrical Sign Manufacturers' Association for the ensuing year in succession to Mr. G. S. Campbell, of Franco Signs. The new vice-chairman is **Mr. F. F. Newlands,** of Claude-General Neon Lights.

The end of this month brings the retirement of **Mr. C. March,** M.I.E.E., district manager, Hornsey district in the Northmet sub-area of the Eastern Electricity Board, where he has served since 1919. Educated at Colchester Technical College, and serving an apprenticeship in that corporation's electricity undertaking, he gained further experience at Stoke-on-Trent before going to Hornsey as mains superintendent. There, he has successively held the appointments of chief technical assistant, deputy chief electrical engineer and manager, and acting chief electrical engineer and manager, prior to vesting day when he became senior executive officer, and finally district manager. A member of the E.P.E.A. since 1918, he is also a past-chairman of the Chief Technical Assistants' Association.

Mr. C. March

After 33 years service with McKechnie Brothers Ltd., **Mr. F. W. Whitehouse,** sales manager in Birmingham, has retired. His successor is **Mr. Donald Byard,** A.S.M.A., A.M.I.EX.

Mr. G. T. Gibb, has joined Associated Technical Manufacturers Ltd., as their Scottish representative. He was previously with Aerialite Ltd. for seven years.

Mr. F. R. Miller, manager of the Transport Department of the General Electric Co. Ltd., is to retire after 46 years with the Company. He was appointed to the Transport Department in 1921, and became manager in 1943.

To mark his valuable services to the negotiating machinery of the Electricity Supply Industry, **Alderman Sir William Walker,** J.P., M.I.E.E., M.I.Mech.E., was the recipient last Thursday of a television set presented to him jointly by the two negotiating bodies—the N.J.B., and the N.J.I.C.—at a luncheon held in his honour at Manchester. Sir William, who is 85, has been a member of those organisations for 34 years, and is the last of the founder members of the N.J.I.C.

Engineer Rear-Admiral Sir Sydney Frew, K.B.E., C.B., R.N. (Ret.)., has been appointed chief fuel engineer to the Ministry of Fuel and Power in succession to the late Mr. J. Price Walters. Sir Sydney, who entered the Royal Navy in 1908, has been fuel efficiency adviser to the Ministry since May 1951.

Mr. W. G. Elliott, A.M.I.E.E., deputy station superintendent at Llynfi Power Station, has been appointed to a similar post in the new Uskmouth generating station, nr. Newport, South Wales Division, B.E.A. Mr. Elliott received his technical education at Treforest and Crumlin Technical Colleges, and served a student apprenticeship with the former South Wales Electric Power Co. From 1939 to 1947 he was employed in various capacities at the Upper Boat power station and headquarters of the company. On vesting day he became the system operations liaison officer of the South Wales Division of the B.E.A., a post which he held until being transferred to Llynfi power station as deputy superintendent in May, 1949.

OBITUARY

Mr. H. L. Bowen, a technical executive of the Valve Division of Mullard Ltd., died on March 17. At the time of his death he was on the first stage of a five-week visit to the U.S.A. and Canada and he was taken ill during the sea voyage to the U.S.A. He joined the company at the Bristol depot in 1924 and later transferred to the London offices, and helped in the formation of the Mullard Technical Service Department. Much of his time was devoted to matters concerning the B.R.V.M.A. and he was chairman of the Association's Technical Committee in 1949. He was also a member of the Valve Standardisation Committee of the International Electrotechnical Commission.

Mr. Arthur Whittaker, A.C.A., a director of Ferranti Ltd., died on March 16, aged 80. A well-known figure in Manchester in his early years, Mr. Whittaker was formerly a partner in the firm of Whittaker, Needham, chartered accountants. He joined the board of Ferranti Ltd. in 1905, and had since then taken an active interest in the business of the company. For a period during World War II, when the chairman and managing director, Sir Vincent de Ferranti M.C. was absent on war service, Mr. Whittaker as deputy chairman, was head of the company.

Mr. A. Whittaker

Mr. F. H. Reeves, a former managing director of the Revo Electric Co. Ltd., died on March 15, aged 76. Because of ill health he had been forced to end his active connection with the company several years ago. He joined the firm at the age of 30 as manager of the then Cable Accessories Co. Ltd. At that time the company manufactured electricity transmission equipment, but under Mr. Reeves' guidance the range of products was quickly widened to include street lighting equipment, electric cookers and other items, and from the small beginning, the Revo Electric Co. Ltd. (as it became in 1927) developed into a large organisation occupying over 60 acres. Locally, Mr. Reeves was well known for his very real interest in his employees and in the development of facilities for their benefit.

Mr. Walter Finlay, O.B.E., W.S., who was general secretary of the Electrical Contractors' Association of Scotland from its earliest days until retiring in 1939, died on March 15. Under his guidance that association grew to its present powerful status. He was also at one time chairman of the Fair Trading Council.

Mr. A. E. Jack, power station superintendent at Chesterfield generating station, East Midlands Division, B.E.A., died recently, aged 56. He went to Chesterfield from Southport in 1937 as senior charge engineer at the Corporation Electricity Works.

Mr. T. D. Boldy, O.B.E., A.M.I.E.E., A.M.I.Mech.E., chief electrical engineer to the Government of Burma, died on March 22, aged 56.

Mr. Andrew Gray, one of the earliest of the wireless pioneers and a personal friend and assistant of the late Marchese Guglielmo Marconi, died on March 22, aged 80. He retired 21 years ago from the position of technical general manager to Marconi's Wireless Telegraph Co. Ltd., having served with that concern since 1899—two years after its formation.

Refrigerators and Purchase Tax

A POWERFUL indictment of purchase tax in general, and its application to refrigeration in particular, was given by Mr. E. Hartley Leather, M.P., at the British Refrigeration Association luncheon, last Friday. He had, he said, always been against the principle of purchase tax and strongly disagreed with the findings both of the Douglas and Hutton committees. He felt that these findings had been formed because of the desire of Customs and Excise to avoid any change in the *status quo*. A general sales tax had been operating satisfactorily for years, in other countries; why was it impossible to use it here?

Mr. E. G. Batt also emphasised, in more detail, the iniquity of purchase tax on refrigerators. For the first time production returns had fallen from £27 million in 1951 to £23·5 million in 1952, and the drop was almost entirely due to purchase tax and hire-purchase credit restrictions on domestic refrigerators in this country. It was impossible to keep up or improve exports without a stable and flourishing home market. A few months ago idle stocks of domestic refrigerators in this country were valued at £2 million, on which purchase tax of £600,000 had been paid. While the Hutton Committee agreed that a scheme could be worked out to provide refund on certain classes of goods, specifically refrigerators, they did not think it could be applied to all classes, and their final recommendation was that everybody must suffer. Any tax reduction would thus inevitably fall on the retailer as the public would not continue to purchase at the old rate. Home food freezers were another case in point. The housewife could not have a home food freezer, because if domestic units were marketed, purchase tax would have to be paid, not only on them but also on a wide range of commercial equipment, now tax-free. This ruling had been laid down by Customs and Excise. In conclusion, Mr. Batt expressed the thanks of the Industry to the Ministry of Supply, who had always received and considered its problems most sympathetically.

The Balance of Research

DEEPENING concern at the widening gap between the nation's scientific needs and its scientific resources is expressed in the Report of the Advisory Council of the D.S.I.R. for the year ending September 30, 1952*. The Council reiterates its earlier warnings that the plans approved in 1946 as a minimum should be implemented; the removal of obstacles to this development require special steps.

With man-power and accommodation severely limited, one serious problem affecting the Department is the difficulty of drawing a balance between advisory and *ad hoc* work on the one hand, and longer range research on the other. The Council expresses itself as deeply concerned at the inadequacy of D.S.I.R. effort in this latter category, and notes that much the same considerations apply to the Research Associations. Basic research, it is suggested, is hardly worth doing if the effort that can be devoted to it is insufficient to secure steady progress.

In a general survey of research activities, the Council welcomes a tendency for Research Associations to become increasingly interested in the analysis and study of industrial operations and processes. This type of work it usually called "operational research," and is is of particular value in showing where laboratory research can be most profitably directed.

Special Grants

Special grants made during the year include one to the Imperial College of Science and Technology for research on better methods of analysis employed in the design and use of electrical plant and power systems. This work involves the use of micro-machines, two of which are being constructed to a scale of 1 to 200,000 (i.e. a 100 MW alternator is represented by a 500 W machine). One of these is to represent a steam-turbine driven alternator, and the other a water-wheel machine.

The Council observes in the report that if, as it believes is generally true, the right sort of scientific work is being carried out, there still remains the question whether the arrangements for placing the results before industry are satisfactory. It rejects the idea that a national scientific advisory service for industry, developed on regional lines, is desirable, preferring to use existing organisations to spread information. However, actual experimental work is proceeding to obtain more reliable data as a basis for future activities in this direction.

* *Department of Scientific and Industrial Research: Report for the Year* 1951-52. H.M.S.O., price 8s.

The BUYER'S *Column*

The Crompton Light-Line

THIS system of lighting has been designed by CROMPTON PARKINSON LTD., Crompton House, Aldwych, London, W.C.2, for use in industry. A Crompton "Light-Line" has three main parts—trunking, control assembly and reflector. Three main features are said to distinguish it—simple installation and maintenance, fully adjustable position of lights and suspensions, rigid construction without sag or warp. The new system allows infinite variation of spacing and the number of lamps to be made quickly and without disorganisation. There is a choice of reflector designs and single- or three-phase wiring can be used with safety. Suspension may be from trusses, purlins, beams, or directly from ceilings, and up to 13 ft apart, the suspensions being arranged to suit the construction of the building.

Wiring normally enters at one or both ends of the run but may be brought in anywhere along the length. Tapping blocks have accommodation for 7·029 conductors looped. Accessories, including control units, are mounted on a separate tray and are wired to a two-pin plug which engages a socket forming part of the mains tapping block. Particular attention has been paid to earth continuity throughout.

A feature of the design is that no tools, other than screwdriver and pliers, are needed for the installation, except for drilling two small holes at the ends of each run.

Based upon the stressed wall principle, patent coupling pieces are positioned and fixed in a matter of a minute or less. Sixteen gauge sheet channel, 4½ in. wide by 2½ in. deep is supplied in lengths 15 ft., 9 ft. or 6 ft., i.e., 15 ft for making the run with shorter lengths to adjust for site conditions.

The tray carrying control gear assembly fixes to the channel by means of quadrant movement fixing bars, and the reflector, when fixed to the tray, interlocks with these bars to ensure that the whole assembly is secure.

Trunking, end plates and suspension strips are finished in french grey industrial enamel; gear tray and reflectors in "Crompton Permawhite" high duty white enamel.

C.E.S. Pilot Lampholders

MANUFACTURERS and dealers concerned with exports of equipment and apparatus to North America will be interested in a new range of pilot lampholders made by A. F. BULGIN AND CO., LTD., By-pass Road, Barking, which accept lamps with small candelabra caps which are standardised in Canada and the U.S. and other countries following their standards. This socket size is intermediate between M.E.S. and S.E.S. The holders are fitted with resilient centre-contact, accurately rolled "shell" and silver-plated solder tags for connections. The insulation is of highest grade s.r.b.p. or f. The holders are built on to most stock "Bulgin" pilot lamp brackets or clips. All standard models have two tags, bracket or clip "dead" from poles, but models with the shell live to bracket and with a single tag can be made to quantity order.

Electrical ratings are quoted as follows: (working) 2 A max., 150 V max. across poles (or 250 V., if via series resistance), 500 V max. to earth. (On a.c. test) 500 V across poles, 1kV to E. dry. Insulation resistance at 500 V is not less than 50 megohms dry.

Carefree Washing

IN our issue featuring the Ideal Home Exhibition we noted the arrival of a new type of electric washing aid, the "Carefree" washer.

This unit, which is produced by CAREFREE DOMESTIC APPLIANCES LTD., 44-48 Adeline Street, Manchester 4, is placed in the normal kitchen sink or in a wash boiler and agitates the water to effect the washing action.

It consists of an electric motor which, we understand, is hermetically sealed in the top half of the plastic casing which drives, by means of a split insulated coupling, a plastic propeller which is suitably guarded so that no moving parts come into contact with the clothes themselves.

The machine is operated by placing it in the

The washer works in a normal sink

sink, filling up with very hot water up to the level marked on the machine, soap powder is added, and about 2½ lb of clothing is placed around the wire grid at the base. The washing time is between 4 and 10 minutes, according to the hardness of the water.

The machine, which is claimed to be shockproof and silent in operation, is guaranteed for 12 months. The motor, which is protected by thermal cut-out, is rated at 70 W. The washer is supplied with 3 yds of three-core insulated cable and a 5 amp 3-pin plug and is for a.c. mains supplies. Price is 17 guineas, tax paid.

Beam from G.E.C. Pen Torch

NEW version of the G.E.C. pen torch fitted with the Osram lens end bulb, is now being marketed by the GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, W.C.

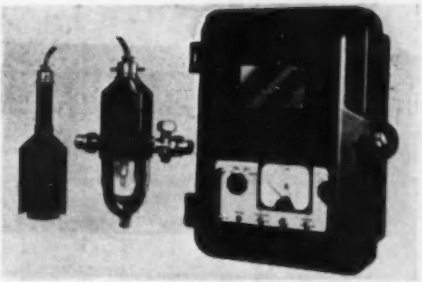
Where a concentrated beam of light is needed for certain types of professional work, e.g. medicine, etc., the more general light from other types of torch would be less suitable. The new model (BA 6119L) was developed to meet this demand.

The lens-end bulb is, by virtue of its shape, well protected against accidental knocks, and is further protected by a white plastic collar. The price of this torch is 3s.9d., plus10d. purchase tax.

E.I.L. Industrial pH Meter

THE model 28 industrial pH meter, made by ELECTRONIC INSTRUMENTS LTD., 17 Paradise Road, Richmond, Surrey, has been developed specifically for factory use. The design of the instrument and the electrode systems is, we understand, the outcome of many years of practical application in the measurement and control of pH in industry.

The model 28 may be used by itself or it may be linked with standard recorders and controllers of the type used in factories for the measurement of temperature, pressure and liquid level. This arrangement enables the plant engineer to set up a complete pH control installation with the minimum of trouble and often with equipment already to hand.



The model 28 pH meter shown with the new high temperature electrode and a sealed reference electrode produced by E.I.L.

Electrically, the model 28 pH meter sets a high standard of performance, as it will run for several days with a stability of ±0·02 pH without routine attention. An important feature is the provision of complete temperature compensation which enables the electrodes to be standardised at one temperature and to operate precisely at all other temperatures without readjustment of the controls. The instrument, designed for wall or panel mounting, is hermetically sealed. Provision is made for pressurising, and a flameproof case can be supplied.

The continuous flow and dip type electrode systems which accompany the model 28 are scientifically engineered to ensure that replacement of electrodes can be carried out with the minimum of trouble and with the assurance that the high insulation required in the electrode head will not be impaired in the process.

TRADE PUBLICATIONS

ACCESSORIES.—New Lundberg accessories price list (LA 1975), with effect from March 12, 1953, is now available from Simplex Electric Ltd., Broadwell, Oldbury, Birmingham.

WIRING.—An illustrated brochure describing the complete all-insulated industrial wiring system which is produced by B. I. Callenders Cables Ltd., Norfolk House, Norfolk St., London W.C.2, is available from any of the company's branches or agents.

LIGHTING.—The new catalogue No. 1020 dealing with Sieray Fluorescent Lighting Equipment is available on request from Siemens Electric Lamps and Supplies Ltd., 38-39 Upper Thames St., London E.C.4.

DOMESTIC APPLIANCES.—A leaflet just issued by Thorn Electrical Industries Ltd., 105 Judd St., London, W.C.1, describes the Mary Ann Doubleway iron which is now in steady production at the Spennymoor factory of Smart and Brown Ltd., which company is controlling the sales of the iron in the U.K.

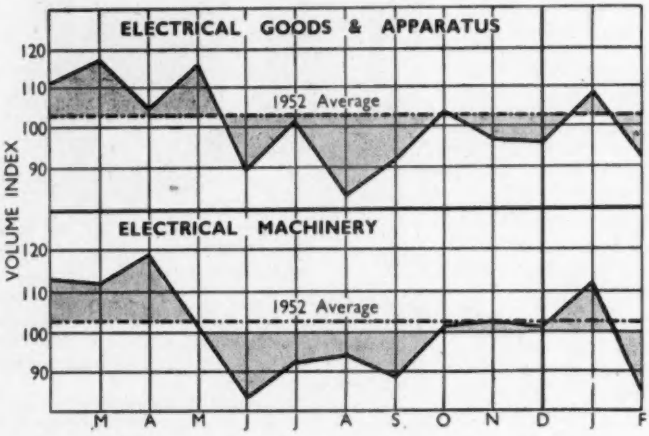
LIGHTING FITTINGS.—Publication HL1655 issued by Edison Swan Electric Co., Ltd., 155 Charing Cross Road, W.C.2, is a catalogue of the commercial and decorative lighting equipment which comprises the Ediswan Harcourt range.

MACHINE TOOLS.—Control gear for use in this field is a speciality of Allen West and Co., Ltd., Lewes Road, Brighton 7, and in a recently published folder will be found details of most of their equipment.

TELECOMMUNICATIONS.—Moving coil headphones by Standard Telephones and Cables Ltd., North Woolwich, London, E.16 are featured in publication C/PA18 recently issued.

DECORATIONS.—Knightshades Ltd., Montagu Road, Edmonton, N.18, have issued a leaflet showing the range of equipment they are producing for the Coronation.

EXPORTS AND IMPORTS



EXPORTS VOLUME INDEX

With only 20 full working days in February, it is not surprising that exports last month were below average, although the incidence of influenza and other seasonal illnesses probably played a supporting role. The "Electrical Times" volume index for electrical goods and apparatus, based on 1950 as 100, fell to 92·5. Exports in this category amounted to £8,331,308 in value.

The picture presented by exports of electrical machinery is no better, the volume index having fallen from 112 to 85 (1950=100). In this class, the value of exports was £4,232,480.

A SUBSTANTIAL reduction in exports of electrical goods during February is reported by the Board of Trade, a decrease which is not only due to the fewer working days in the month. Compared with January, last month's total of £13,076,173 was a drop of over £2½ millions. The decrease was fairly evenly spread over most of the items, the exceptions showing a slight increase in value being generating sets and vacuum cleaners, etc. Apart from the goods listed in our table, complete electric washing machines up to 150 lb in weight, to a value of £142,914, were sent abroad in the month along with larger machines (between 150 lb and 250 lb) valued at £78,695.

Description	Exports Value Month of February			Imports Value Month of February		
	1951	1952	1953	1951	1952	1953
	£	£	£	£	£	£
Telegraph and Telephone Wires and Cables—						
Submarine	93,699	9,489	76,865	—	—	—
Other	453,547	448,547	670,528	—	—	—
Rubber Insulated	320,842	654,074	459,371	—	—	—
Insulated, other than Rubber	606,743	1,384,705	1,575,544	—	—	—
Wireless Apparatus, including Valves ...	1,206,282	2,136,908	1,857,777	234,779	289,356	263,639
Telephone and Telegraph Apparatus ...	1,170,800	1,473,940	1,328,103	—	—	—
Electric Lighting Appliances, Accessories, Fittings and Parts:—						
Filament Lamp Bulbs	97,581	159,285	76,230	12,394	12,272	9,262
Other Descriptions	275,055	461,444	381,973	18,997	46,397	15,491
Batteries (primary)	156,567	234,549	203,614	—	—	—
Accumulators, Portable	184,291	536,649	153,337	—	—	—
,, Stationary	10,170	70,820	42,697	—	—	—
,, Parts and Accessories ...	69,481	57,983	48,005	—	—	—
Electrical Cooking and Heating Appliances ...	276,427	608,371	259,573	—	—	—
Ammeters, Voltmeters, etc., and Parts ...	124,994	134,278	122,191	34,192	90,591	47,599
House Service Meters	81,826	147,172	61,651			
All Other Instruments	121,080	120,353	140,597			
Electro-Medical Apparatus	40,819	45,018	32,417	—	—	—
X-Ray Apparatus, etc.	112,103	193,005	120,087	33,182	73,064	20,874
Insulating Materials	156,618	246,616	90,675	—	—	—
All Other Articles	389,548	617,340	630,973	116,393	223,492	75,830
Total of Group	5,948,473	9,741,546	8,331,308	449,937	735,142	432,695
Electrical Machinery:—						
Generating Sets, Diesel (not exceeding 200 kW)	241,569	436,377	394,687	38,504	37,800	37,666
,, ,, ,, (exceeding 200 kW) ...	108,665	145,479	128,541			
Other Generating Sets	104,667	485,476	92,848			
Generators minus Prime Movers and Parts	255,138	355,530	220,133			
Motors	640,504	945,834	874,735	30,106	64,166	42,807
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	2,018,296	2,846,440	2,521,536	11,698	22,458	49,978
Fans, Electrically and Power Driven ...	107,753	183,937	201,282	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	355,296	612,919	311,103	—	—	—
Total Appliances and Machinery ...	9,780,361	15,753,538	13,076,173	530,245	859,566	563,146

The WEEK in NEWS

Fireguards Act Now in Operation

Regulations should be Published this Week

THE Heating Appliances (Fireguards) Act 1952 became operative last Monday. An order giving effect to that decision was issued by the Home Secretary last week, in accordance with the final section of the Act which left the obligation of naming the date with him. The date of operation having been stipulated, the way is clear now for the publication of regulations governing the construction and fitting of the guards. It is not known, at the time of going to Press, when those regulations will be published, but they are certain to be available in the near future, and probably within the week. Neither is it known at present when the regulations will become effective, but it may be assumed that a reasonable time will be allowed to elapse so that manufacturers will be able to comply with stipulations.

In the meantime, a reasonably accurate idea of the nature of the regulations may be gained from the British Standard B.S. 1945, Fireguards for Heating Appliances, issued last month.

B.I.C.C. in Canada

FOLLOWING their announcement last week of the formation of a new company in Australia, British Insulated Callender's Cables Ltd. state that they have acquired, as from April 30, the cable and wire business of Phillips Electrical Works Ltd., Canada. Through a new Canadian company which they are forming under the title Phillips Electrical Canada (1953) Ltd., B.I.C.C. will carry on the business as a going concern at the existing Brockville and Montreal factories. Existing personnel will be retained. Further to last week's report of the company's new Australian venture, our reference to construction and installation work being carried on in collaboration with B.I.C.C. Ltd., should, of course, have read "British Insulated Callender's Cable Construction Ltd."

Trafalgar Square Signs Inquiry

THE Ministry of Housing and Local Government inquiry into the advisability of the erection of illuminated advertising signs in Trafalgar Square took place in the latter part of last week. The inquiry considered objections to Westminster City Council's ban on the advertisements, imposed some time ago. The Council maintains that the square has numerous historic associations and traditions, and that the advertisements concerned introduced a discordant note out of harmony with the character of the square. It is understood that 12 hoardings are affected by the ban.

Main contention of the advertisers was that the signs added to the gaiety and liveliness of the Square, and in fact, actually hid several unsightly objects. A public opinion poll among passers-by, quoted, showed that 81% thought the removal of the signs would be a bad step.

RELAXATIONS ON TRADE WITH WESTERN EUROPE

RELAXATIONS on imports from Western Europe and import quotas for the period beginning July 1 next were announced by the Board of Trade on Monday. Because of the balance of payments situation the restrictions were imposed on European imports in November, 1951, and March 1952. Many goods have now been restored to Open General Licence, but the only change listed which affects the electrical industry is the addition of switches under Group 12 (Electrical Goods). The industry appears unaffected by the amendments to O.P.L.

At the same time, import quotas for the first six months of 1953 have been set out in Notice to Importers 547, together with details of how to apply for licences. As regards the smaller electrical appliances, such as blankets, fans, irons, kettles, vacuum cleaners, etc., we note that goods to the value of £50,000 will be imported. Value of lamps and lighting appliances to be imported will be £82,000 and finally, as regards miscellaneous items such as dishwashing machines, lawn mowers and refrigerators (not exceeding 12 cu ft capacity), the quota will be £30,000. Applications for licences must be submitted to the B.o.T. by April 18.

The First Half-Century

Josef Nagy, of Szegedin, Hungary, has patented a washing machine in which clothes are electrolysed in a saline solution. The clothes are intended to be freed from grease and dirt by the liberated alkali, and bleached by the chlorine or other oxidizing agent at the anode. It would require careful management to avoid the fabrics being rotted.—*From our issue of March 26, 1903.*

OFFICIAL PUBLICATIONS

HEATING APPLIANCES (FIREGUARDS) ACT, (COMMENCEMENT) ORDER, 1953. *S.T.* 416 (*see page* 601). H.M.S.O., 2d.

CENSUS OF PRODUCTION. *Vol.* 12; *Building and Contracting, Gas, Electricity and Water. Report for* 1949. H.M.S.O., 2s.

BRITISH STANDARDS. *B.S.* 1962: *Patients' trolleys (fixed top) for use in hospitals (includes tests in conducting rubber).*

DEPT. OF SCIENTIFIC AND INDUSTRIAL RESEARCH. *Annual report for* 1951-52. *Command Paper* 8773 (*see page* 597). H.M.S.O., 8s.

E.R.A. REPORTS O/T9: *Tests on Italian Design of a* 275 *kV Single-circuit Suspension Tower*, by P. J. Ryle, 10s. 9d.; Z/T90: *Review of Technical and Economic Position of Selenium*, by A. M. Cassie, 10s. 9d.

SAFETY IN USE OF POWER PRESSES. *Second report by Factory Dept. of Ministry of Labour.* H.M.S.O. 1s.

ECONOMIC OVERSEAS SURVEY. *India.* H.M.S.O. 11s.

A Dinner for Technical Officers

LEADING technical officers assembled at the Charing Cross Hotel, London, last week for the annual dinner for technical committees of the Cable Makers Association. About 100 engineers, chemists, metallurgists and other experts, who regularly participate in the proceedings of the Association's Technical Committees, attended the function which has now been held each year since 1938. We understand that at present there are some thirty of these Technical Committees. Chairman at last week's dinner was Mr. F. W. H. Shaw, of Siemens Bros. and Co., Ltd.

Plan for Export Groups is Spreading

CO-OPERATION among British firms in order to establish offices abroad for the joint use of a group of companies, appears to be gaining favour. In the past week or two we have noted the Engineering Industries Association's plan to set up an office in Toronto on behalf of some 40 manufacturers, and a similar suggestion put forward by the Scottish Council (Development and Industry). Latest proposal follows last week's meeting of the Midland Regional Board for Industry when a scheme was announced by the Board of Trade and Ministry of Supply. This calls for the grouping of small firms making complementary products, who would be required to pool their resources to form an overseas sales organisation, which individually they could not afford.

The Government will not give financial aid, but the group will be advised to approach the Export Credits Guarantee Dept. The scheme has the backing of the Government departments concerned, who have production statistics of nearly every small firm in the Region and have offered to put firms into touch with others making complementary products. First intimation of this scheme was given by Mr. Duncan Sandys during his tour of Midlands last January, (see our January 15 issue). Other of the Ministry's Regional Controllers are being sent particulars of the scheme.

DESIGN FROM BRITAIN

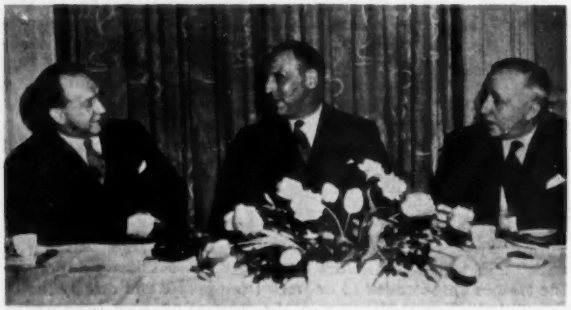
SEVERAL lighting fittings have been included among some 200 items of good current British designs which will be displayed in a U.S. travelling exhibition called: "Design from Britain." Goods were selected by the Council of Industrial Design on behalf of the Dollar Exports Board. The exhibition will visit most towns.

ONE WELSH AUTHORITY PLAN IS REJECTED

A NUMBER of references have been made to Caernarvonshire's plea that Wales should be a separate entity as far as the generation and distribution of electricity was concerned. The County Council's resolution to that effect came before the recent meeting of Welsh Local Authorities. Although proceedings of that meeting are not available, it was reported at a meeting of Machynlleth urban council last week that the resolution was rejected. It is understood that a most convincing case was put forward in opposition to the proposal.

Use of Electricity in Housing

A NEW brochure produced by E.D.A. in an attractive style sets out to explain how to make the best use of electricity in the construction of new houses and flats. The publication is mainly directed to architects and builders and points out that all the services needed in a home—washing, cooking, heating, refrigeration, radio etc.—can be provided efficiently and economically by one installation from one main service cable. Figures have been given showing the cost of the various items involved in providing a supply to an estate. The 20-page booklet is entitled "Making the Best Use of Electricity in Housing" and is available from E.D.A.



Chairman Mr. F. W. H. Shaw, at the dinner of the Technical Committees of C.M.A. last week. With him are Mr. W. Lewis Smith, deputy chairman of C.M.A. (right) and Mr. F. Waine, chairman of C.M.A. (left)

Development Scheme for Falmouth Docks

STEADY growth in the volume of repair work and refitting of vessels in Falmouth docks, and coincidentally the increased demand for electricity, has led to a large scale development scheme through which the S. Western Electricity Board hope to provide a mains supply which will eventually replace the dockyards existing d.c. system. Annual consumption is now nearly 3½ million kWh.

The Board intends to take an 11 kV supply from their substation near Penryn direct to the docks. The o.h. line has been erected and about 1,000 yd of underground cable laid. The 11 kV cable will feed into a substation just inside the dockyard where the supply will be metered. A ring main and eight other substations are being built to distribute current at high voltage and to supply the dry docks, wharves and workshops. High-tension and l.t. switchgear is being provided and also three banks of 6-phase rectifiers for conversion of a.c. supplies for use of present d.c. equipment.

In the dockyard there are some 500 individual electric motors, numerous cranes, as well as four main pumps, electrically operated equipment in the workshops, and complete floodlighting system. Two new wharves are to be built in the next two years.

Second Management Conference in Perth

FOLLOWING the outstanding success achieved by the first Scottish Conference on Management last year, the venture is to be repeated between April 10 and 12 next. Senior managers will again meet at Gleneagles Hotel, Perthshire, during that weekend. Although primarily intended for Scottish members, those from other parts of the U.K. will be welcomed by the organisers, the British Institute of Management. Due to the limited accommodation available, early application is advised. Main subject for discussion will be Forecasting the Market, New Tools of Production, and Raising the Next Generation of Managers.

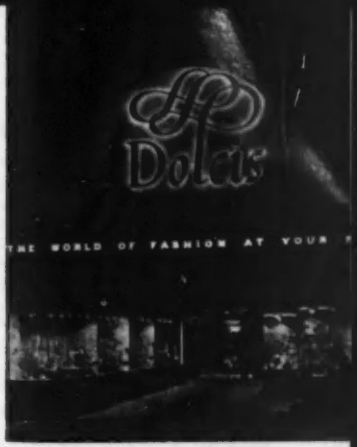
INDUSTRIAL RELATIONS

YET another residential course is being arranged by the Institute of Personnel Management. It will be a five-day course on Industrial Relations and will take place at the Skelmorlie Hydro Hotel, Skelmorlie, Ayrshire, between April 13 and 18. It is intended for those having special responsibility for negotiation and consultation and those whose jobs include assisting the settlement of day-to-day disagreements in the factory and the interpretation of agreements. Numbers will be limited to 20, and applications should be made to the Courses Secretary.

SECOND ELECTRICAL EXHIBITION IS ON

THE fruits of many months of arduous preparation by the organisers and over 100 exhibitors are now to be seen at the Second Electrical Engineering Exhibition at Earls Court. It is truly remarkable how this exhibition has grown from a small A.S.E.E. branch function in 1951 to the displays of some 60 manufacturers at the New Horticultural Hall last year, and finally to the full-scale event at one of Britain's leading exhibition centres. We have little doubt that the electrical industry will benefit greatly from these four days and we sincerely hope that our many friends will find time to visit us on stand 92. The exhibition closes on Saturday.

THE new circular fluorescent fitting illustrated on page 529 of last week's preview of exhibits, is a product of Siemens Electric Lamps and Supplies, Ltd., and not as previously described. On page 533, the capacitance resistance bridge shown is one of the range of models made by Taylor Electrical Instruments, Ltd.



This new sign, measuring 13½ ft by 10½ ft, manufactured and installed by Courtney Pope (Electrical), Ltd., at the Toronto branch of the Dolcis Shoe Co. The oval background consists of two sheets of plate glass with a Plyglass diffusing panel between. Lettering, recently standardised by Dolcis, was built-up from sheet metal, and illumination provided by neon tubes fitted behind the glass. The sign was designed by Ellis E. Somake, staff architect to Messrs. Dolcis. A similar sign is to be fitted at the company's London, Ontario, shop

London's Spring Lighting Course

DETAILS of the 66th Illumination Design Course to be held in London next month have been given by E.L.M.A. This spring course will extend over four days between April 21 and 24, and once again we note that a remarkably high number of lectures will be given in that short space of time. The subjects follow the usual pattern of introductory aspects, lamps; various applications, on the eye, vision, and lighting terms; design; and an explanation of E.L.M.A. The compact nature of the programme is shown by the fact that there are six sessions scheduled for the first day, seven for the second day and eight for both the third and final days. It will be recalled that the extent of the course was shortened drastically last year. Applications for reservations should be addressed to Mr. E. B. Sawyer at the Lighting Service Bureau, 2 Savoy Hill, W.C.2.

Supervisors for Meter Readers are Justified

IT was not many months ago that the subject of meter reading was in the news, and the appointment of supervisors was a current topic of conversation. We note that last week the secretary of the London Electricity Board gave some information concerning the effect of the decision to appoint meter reading supervisors. He was replying to an article in a Yorkshire paper. The secretary stated that a year ago the total number of meter readers was 674. At present the total men employed was 487. The reduction of 187 had come about through retirements, resignations and various other causes, he stated, but although it amounted to some 28% of the original meter reading force, there had been no diminution of the amount of work done. The secretary went on to state that the appointment of supervisors had been abundantly justified. They accompanied men on their rounds, and the Board was confident that the improvement would continue until standards set as a fair day's work were reached.

E.A.W.'s 28th Annual Conference and Lunch on April 15

ABOUT 600 members and friends representing most of the 124 branches of the E.A.W. in England, Scotland and Wales are expected in London on April 15 for the Association's 28th annual conference. The annual meeting will be followed by a luncheon and visit to the electrical section at the Building Centre. Speakers at the lunch will be Miss Pat Hornsby-Smith, M.P., who will reply to the toast "Coronation Year" proposed by Mr. H. F. Randall, chairman of L.E.B., and also Lady Maxwell-Fyfe, president of Liverpool branch of E.A.W., and Col. B. H. Leeson, president of I.E.E. The Dowager Lady Swaythling will preside. On the previous day the golf competition for the Lady Hughman challenge bowl will be played at the Highgate golf club.

ELECTRICITY AN IMPROVEMENT ON GAS

AN excellent example of the improvement in street lighting resulting from the conversion of gas lamps to electricity is provided by the accompanying illustrations of a scheme recently carried out at Leyland, Lancs. The new installation employs 250 W mercury vapour discharge lamps housed in horizontal enclosed lanterns. In all, 115 lanterns were used and were mounted on 25 ft concrete columns. Lighting equipment was supplied by the British Thomson-Houston Co., Ltd., and contractors were Erecon, Ltd., of Ware.

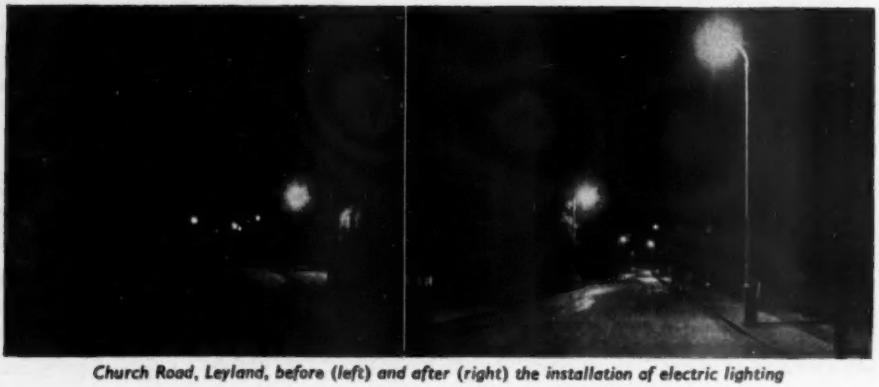
Factory Equipment on Show This Week

ALTHOUGH the electrical industry will probably be primarily concerned with the second Electrical Engineering Exhibition being held at Earls Court, there is another exhibition current in London which is of interest to the engineer. This is the first National Factory Equipment Exhibition which is being held at the Royal Horticultural Hall this week. It closes on March 27. Much of Britain's most modern factory equipment, designed to increase production and decrease costs, is being displayed. Exhibits include mechanical handling equipment, safety gear, protective clothing, automatic tools, dust removal systems, and workers' welfare equipment. There is also a display of industrial films. Numerous electrical aids are on show.

Prominent exhibitor is E.D.A. who are showing three aspects of electricity's aid to industrial efficiency and productivity.

Brighton 'B' Coal-Handling

IN the article on Brighton 'B' power station which appeared in our issue of March 12, we described the extensive coal handling installation which is in use. This has been supplied by Mitchell Engineering, Ltd., a fact which was omitted from the original description.



Church Road, Leyland, before (left) and after (right) the installation of electric lighting

CONSULTATIVE COUNCILS

Scheme to Replace Capital Contributions

RECOMMENDATIONS regarding capital contributions by prospective consumers were made last week at a meeting of the Southern Electricity Consultative Council. Two such suggestions were made. Firstly it was proposed that in lieu of lump sum contributions, prospective customers should be allowed to guarantee enough revenue to bring in the requisite return on capital expenditure. The guarantee would be progressively reduced when more consumers took advantage of the supply. Secondly, it was recommended that the Board submit to the consumers concerned, statements of accounts showing how the amounts of the guarantees had been calculated.

Rising Costs Hamper Export Trade

THAT increasing charges for electricity were having a detrimental effect on the export trade was emphasised by a deputation of the British Pottery Manufacturers' Federation at last week's meeting of the Midlands Electricity Consultative Council. Seeking support for its protest against further increases, the Federation maintains that it cannot bear any extra costs if it is to keep its place in the dollar earning market. The cost of electricity was out of all proportion to other forms of heating, it was stated. The deputation also asked for the abolition of the maximum demand charge, and the reinstatement of the practice of allowing 5% discount for prompt payment. These views were forwarded to the Board for their observations.

A WEEK'S COURSE ON ELECTRICAL SAFETY

FULL details of the course on "Electrical Safety" to be held at Burton Manor Residential College for Adult Education were given last week. The course will take place between April 19 and 24, and will be solely residential. Last year the 22 resident places were found to be inadequate and the number has been increased to 60 and non-resident places excluded. The course is intended for graduate electrical engineers interested in the design, installation and operation of apparatus. Standard of knowledge should not be less than Higher National Certificate or University Degree. Lectures this year appear to lay particular emphasis on fire hazards. Apart from the talks, however, we note that several experts from overseas will be attending, thus presenting admirable opportunities for exchange of ideas. Fees for the course are £9 5s. for students under the Local Education Authority, and £10 for others. Applications should be addressed to The Warden, Burton Manor, Burton-in-Wirral.

Permali's New Film

THE manufacture and uses of Permali, densified wood laminates, form the subject matter of a new 30-minute film, "Strength Where You Need It" produced for Permali Ltd. The story traces the making of this material from the time a tree is felled, through its various processes, to the finished article. It goes on to relate the production of machined parts and assembly into heavy electrical and other engineering machinery.

E.W.F. Cheque for E.I.B.A.

THE E.I.B.A.'s exchequer will be the richer by £2,819 4s. 3d. as a result of contributions donated in the Electrical Wholesalers Federation's annual collection. This figure incidentally is a record, being over £585 more than the amount subscribed in 1951. For the second successive year, the E.I.B.A. cup has been awarded to the London and Eastern section which subscribed an average of £20 12s. 6d. per head. Overall average contribution per member this year was £11 11s. 1d.

While on the subject of E.I.B.A., we note that a buffet dance is being organised by the Merseyside and N. Wales Area. It will take place at the Victoria Hotel, New Brighton, on April 17.

Electrical Industries Golf Championship

THIS year's national final of the E.I.B.A. Golf Championship is to be held at Moortown and Sand Moor Golf Club, Leeds on September 21 and 22. This was confirmed at a recent meeting of the national committee when Sir Henry Self agreed to continue as chairman during the coming season. Mr. W. J. Bird, who has been the hon. national secretary during the past three years, has resigned, however, and has been succeeded by Mr. Frank Farthing of Magnet House, Kingsway, W.C.2.

NEWS IN BRIEF

Wolf Electric Tools, Ltd., have opened a new office and service depot at 405 York Road, Leeds 9. It will replace that in Park Square, and be under the direction of Mr. D. S. Powell.

Summer meeting of I.E.E.'s Western Centre will be at Woolacombe, N. Devon, between May 15 and 18.

H.R.H. the Duke of Edinburgh has agreed to become an honorary member of the Institute of Fuel.

Management training facilities for two junior executives at present engaged in British industry are again offered this year by the Harvard School of Business Administration and the British Institute of Management.

"Materials Handling and Processing, Past and Present," is the title of an address by E.D.A.'s Mr. L. Landon Goodman to be given at the Royal Society of Arts on April 15.

Questions in Parliament . . .

Electrification of Railways

Asked about present and future plans for railway electrification, Mr. G. Braithwaite said last week the Manchester-Sheffield-Wath project was being carried out at present. Stage 1, between Wath and Dunford was already in operation, he said, and the full scheme should be completed in 1955. The cost would be about £11 million and £5 million for the tunnel. Mr. Braithwaite also said the scheme next in priority was in eastern London on the Southend line.

Nuclear Power for TV

Replying to a question by Mr. Hector Hughes last week, Mr. D. Gammans said the B.B.C. were not aware that it was possible to apply nuclear power to television. Informed that the matter had been discussed in scientific papers, Mr. Gammans said he would be pleased to pass on any proposals.

Brighton Booster Station

The Assistant Postmaster-General gave some details of the television facilities provided for Brighton and Hove. He said the B.B.C. proposed to erect a booster station in the neighbourhood to pick up TV signals direct from Alexandra Palace, amplify them and then re-broadcast on low power. The object was to give a reasonable service to local residents who could make little use of sets due to the screening effect of the South Downs. He added that no other booster stations had been authorised.

New Redruth Transmitter

The proposed new transmitter at Redruth would be in operation before next winter, Mr. Gammans told the House last week. Its purpose was to provide better reception of the B.B.C.'s Home Service.

V.H.F. Broadcasting

Mr. Hayman asked when the ban on capital expenditure projects could be relaxed so that the B.B.C. could introduce very high frequency broadcasting. Mr. Gammans explained that before v.h.f. sound broadcasting could begin, the form of modulation to be used and the best way of developing the service had to be decided. These questions were to be considered as soon as possible. After that, he said, progress would depend on the amount of national capital resources available. Mr. Gammans said he could not, at that moment, give any idea of the amount of capital expenditure involved in the introduction of very high frequency.

Advertising the B.I.F.

The President of the Board of Trade was questioned about the advertising of continental trade fairs in the British Industries Fair catalogue, and whether similar arrangements were made for publicising the B.I.F. The Minister stated that more overseas visitors were likely to be persuaded to visit this country if they knew that they could include other trade exhibitions in their one itinerary. It was considered to be a worthwhile practice whether or not they reciprocated, although, in fact, many of them did, he said.

Coronation Arches

The cost of the four arches and their decorations, including experimental work and lighting, which are to be erected along the Mall for the Coronation, will be about £20,800. The Minister of Works told the House this last week.

Nationalised Industries

The Prime Minister was asked last week by Mr. Grimond whether any changes in the methods of management and control were to be introduced in those industries which were to remain nationalised. Mr. Churchill said no changes were contemplated at present but those matters were kept continually under review.

Fog Investigation

A detailed study of evidence obtainable from hospitals, vital statistics and other sources, was in progress as an inquiry into the number of deaths in Greater London attributable to last December's fog, the Minister of Health said last week. A committee was looking into the facts, he added, but he was not yet in a position to make any statement.

Imports of Machinery

It has been decided to set up a committee to review the long-term problem of the duty-free entry of machinery into Britain, Mr. P. Thorneycroft stated. Its terms of reference will be to consider and report whether it is in the national interest to provide for the duty-free admission of machinery, either by classes or in individual consignments. Sir Henry Wilson Smith had agreed to act as chairman.

Nuclear Energy

On Monday Mr. Hector Hughes asked the Minister of Supply the annual cost of research into the application of nuclear energy to industrial and other peaceful purposes. Replying, Mr. Duncan Sandys stated that work on the application of nuclear energy to peaceful purposes is so interwoven with the general body of work on atomic energy that it is impossible to make a separate assessment of the cost.

Nutty Slack

In a written reply to a question from Mr. Hamilton, Mr. Geoffrey Lloyd, Minister of Fuel and Power, stated that some 277,000 tons of "nutty slack" had been sold up to the end of February. The N.C.B. had not yet decided whether they would continue to offer nutty slack during the summer.

Electric Supply News . . .

Belfast

The Corporation Electricity Committee has recommended to the City Council that the names of the Victoria and Harbour power stations should be changed. The proposed names are Belfast Municipal Electrical Undertakings—East and West.

Douglas

As from May 1 electricity tariffs are to be increased by 5%. At the Council meeting recently, Councillor T. Radcliffe, chairman of the Electricity Committee, said the increase was due to the rise in the cost of coal. In the current year there was a loss of £13,000 on the undertaking, which could have been met out of reserve, but the extra coal costs had to be passed on. Coal was now 200% dearer than in 1939, and was poorer quality while wages had increased 120%, he said. A great deal of money had been spent on new plant, and the change-over from d.c. to a.c. had been completed during the year, except for one street. Interest and sinking fund charges for borrowings on that expenditure had been very heavy. "I trust the public will realise the difficulty the Committee are in," said Councillor Radcliffe. "Maybe electricity might have been cheaper if there had been one generating authority in the Island, but any fault—and it is a serious fault—would have been overcome very easily if the Council's proposals had been accepted."

N. Ireland

The Electricity Supply (Amendment) Bill was presented in the Northern Ireland Parliament last week. This provides for a return to the guarantee system in the supply of rural electricity in Ulster. For the new consumers this means that the position in regard to the cost of a supply will be as before the passing of the 1948 Act. That legislation placed a duty on the Electricity Board for Northern Ireland to pursue a policy of rural electrification, and thereby connect consumers without charge for transmission lines and transformers, unless it would be too uneconomic. But in recent years the cost of erecting lines, etc., has increased tremendously and the Board has had to protest to the Government at having to carry out extensions which have involved large sums of money, but for which the anticipated annual return will be small.

Shetland

In future the North of Scotland Hydro-Electric Board is to make a connection charge to new consumers in the Shetlands area. Practically all existing consumers had been connected without charge, but now that the Board is going to the Island of Bressay there is to be a charge of £1 per room, plus the current consumed. Announcing this decision to the County Council, Mr. W. D. D. Fenton, the Board's secretary and commercial engineer, pointed out that the Board incurred a loss of £30,000 in Shetland in 1951 and about £40,000 last year. Before the present scheme was completed the loss would be nearly £60,000. When the Board took over the Lerwick undertaking in 1947 there were 1,520 consumers. In five years the total had increased to 3,300 and there were a further 800 authorised. The cost of the completed scheme would be £500,000.

Southampton

The local Chamber of Commerce has received urgent representations from its members on the serious economic drawbacks of direct current, and is pressing the Southern Electricity Board to hasten the change-over from d.c. to a.c. in the affected areas.

Yorkshire

A National Coal Board spokesman has stated that designs had been examined for the building of a pit-head power station at Grimethorpe. The Board believed the station should be designed to burn fuel that was difficult to sell, but official plans have not yet been approved. Mr. E. H. Browne, the Board's Director-General of Production, said recently that the Board had agreed with the British Electricity Authority to share the erection of two pithead power stations in Yorkshire and Ayrshire.

LIGHTING SCHEMES

Dorchester.—M.o.T. has estimated that there will be no objection to the T.C.'s proposal to convert street lamps from gas to electricity.

Middlesbrough.—The T.C.'s future electricity development plans include street lighting on the Berwick Hills Estate (£2,500), and Park End Estate (£4,000), additional lighting on privately developed roads (£1,000) and the replacement of gas by electricity in existing streets (£5,000).

Paddington.—The Council is considering a scheme for the conversion of street lighting from gas to electricity.

Scarborough.—The M.o.T. Divisional road engineer is prepared to consider an application to convert the lighting on A.165 from gas to electricity, at a cost of about £6,000.

Southport.—The Council has received ministerial approval to a £5,350 scheme to install sodium lamps in Scarisbrick New Road.

South Westmorland.—The R.D.C. has appointed a sub-committee to prepare a scheme for the development of street lighting in the area.

Taunton.—New schemes are to be prepared for the public lighting in Hamilton Road, Wellington Road and Staplegrove Road. The surveyor is also to report generally upon lighting in other roads with a view to submitting to the council appropriate recommendations for effecting improvements over a period of years.

Welshpool.—T.C. applying for consent to borrow £2,388 for the provision of electric lighting in certain roads.

Company Activities . . .

British Relay Wireless and Television Ltd.

Consent of the C.I.C. has been received for the proposed issue of capital to which we referred on January 22. The whole of the 1,200,000 "A" shares and 450,000 of the "B" will be issued for cash at 10s. a share. A balance of 250,000 "B" shares will be issued to Pye, Ltd., and Murphy Radio, Ltd., in exchange for the shares of Link Sound and Vision Services, Ltd. Besides the capital of the Link group the new company is to acquire the shares of the companies constituting the B.R.W. group. The directors of the new concern are noted on page 595.

British Vacuum Cleaner and Engineering Co.

The Ordinary dividend for the year to September 30 last is again 25%. The group net profit at £47,525, after taxation, is nearly £40,000 lower than for the previous year.

Bylock Electric Ltd.

A dividend of 50% is to be paid for the year ended July 31 last, the same as for the previous year, although the net profit after allowing various charges, but before taxation, dropped to £15,742 compared with £24,432 for the year before. The directors propose to make a rights issue on a two-for-one basis at par.

English Electric Co. Ltd.

Further tests on prototype gas turbine units for two 20,000 kW sets have been undertaken by this company, Sir George H. Nelson, chairman and managing director, revealed at the annual meeting last Thursday. They can also now offer deliveries of certain sizes of steam turbines in 18 months to two years from the further productive capacity created to enable the firm to increase output as and when the demand arises. Among other items to which he referred is a new single-phase house service watt-hour meter which has been specially developed for the Canadian market. On the business in 1952 he stated that deliveries were £11 million more than the previous year, while the orders remaining on the firm's books stand at a level which will enable the company to reach in 1953 and 1954 a volume as high as was attained in 1952. Their success in securing orders in export markets during the year is shown by the fact that they have reached the very high level of 55% of the total business obtained for normal products.

Ferranti Ltd.

It is proposed to increase the capital to £3¼ million by the creation of one million 5½% Third Cumulative Preference shares of £1 each, and to capitalise £1 million of reserves. A meeting to consider these proposals is called for April 9. The directors to pay up in full at par 500,000 5½% Third Preference £1 shares and one million Ordinary 10/- shares for distribution to Ordinary stockholders on the basis of one Preference share and two Ordinary for every £1 of Ordinary held.

Hoffmann Manufacturing Co.

Although the group net profit for 1952 increased by nearly £400,000, taxation jumped by over £380,000, leaving a net profit of £466,074 compared with £470,668 for the previous year. The dividend is raised to a total of 17½% (against 12½%) by a recommended final of 10% plus a 2½% cash bonus.

North of Scotland H. E. Board

This list will open and close today, March 26, for applications for the £20 million of 4% guaranteed stock, 1973-78, offered at a price of 96%. The purpose of this issue is to repay temporary advances from the Scottish banks which at March 18 amounted to £5,800,000, and to defray further expenditure on constructional schemes. Particulars were publicised on Tuesday.

Sangamo Weston Ltd.

A substantial, and encouraging, increase in the trading profit for 1952 would seem to indicate that this concern has successfully weathered the unfortunate position which arose in the electricity meter industry in 1951. In that year this company had to make drastic price reductions which were reflected in the decrease of its trading profit from £310,260 in 1950 to £128,057 in 1951. But now comes the better news that the trading profit for 1952 is £217,408. The dividend also remains at 12½%. Taxation, of course, takes an extra £42,000, but the net profit, after all charges, is £71,996 (£33,167). A notable point is that the carry forward is quite substantial—£414,570 as against £363,246 previously.

Singapore Traction

The board has accepted an award in connection with the company's war damage claim, the chairman states. The amount is about £124,700 apart from a further £10,334 as the cost of the restoration of certain items of property. Half the former sum and 30% of the latter amount has been paid.

Switchgear and Cowans Ltd.

An increase of nearly £20,000 in the net profit for 1952 (before charging taxation) is reported. The figure is £107,209 as against £88,316 in 1951. The dividend is again 22½%, but on capital increased by an issue to institutional investors of £200,000 5½% Debenture stock, 1977.

Dividends Declared

Electric Furnace Co. Interim of 5½% (4½%).
James Howden. Interim of 7½% (*same*).
Nigerian Electricity Supply Corpn. Interim of 4% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

Mar. 27.—Westhoughton U.D.C. Supply and erection of about 132 concrete columns and 75 steel brackets in Bolton Rd., as well as installation and wiring of fittings and auxiliary equipment. Also supply of enclosed reflector-type lanterns, lamps, etc. F. H. Walker, Engineer and Surveyor, Town Hall. Deposit £2 2s.

Mar. 27.—Windsor T.C. Electrical installation in 44 flats on Manor Farm site. Borough Engineer, Kipling Building, Alma Rd.

Mar. 28.—Isle of Ely. Electrical equipment, including fires, radio sets and loudspeakers, wiring, etc., for old people's homes. R. F. G. Thurlow, Clerk, County Hall, March.

Mar. 28.—Northern Ireland. New electrical installations and alterations to existing l.t. overhead service mains at Londonderry Chest Hospital. W. and M. Given, Architects, 1 Waterside, Coleraine. Deposit £5 5s.

Mar. 28.—Rochester. (*a*) Supply and erection of steel columns, brackets, lanterns, etc., for 20 points along Gravesend Rd., and (*b*) erection only of concrete columns, and supply and erection of lanterns, etc., for 66 points along Maidstone Rd., Gun Lane, Cuxton Rd. and Rochester Esplanade. City Surveyor, 66 Maidstone Rd. Deposit £2 2s.

Mar. 28.—St. Neots U.D.C. Installation of electricity in 20 houses in Almond Rd. Surveyor to Council, Council Offices, Huntingdon St. (See March 12 issue.)

Mar. 30.—Carmarthenshire. Installation of electric lighting on two roundabouts adjacent to Carmarthen Bridge. J. L. Richards, County Engineer and Surveyor, Roads and Bridges Dept., County Hall, Carmarthen. Deposit £2 2s.

Mar. 30.—Litherland U.D.C. Supply and erection of concrete columns with all lighting equipment for street lighting on Netherton Park estate. Engineer and Surveyor, Town Hall. (See March 12 issue.)

Mar. 30.—St. Helens T.C. Supply, erection and wiring of 63 concrete columns with 400 W H.P.M.V. lanterns for street lighting. M. Ward, Borough and Water Engineer, Town Hall. Deposit £2 2s.

Mar. 31.—Durham. Electrical installation in Haswell county, Ushaw Moor county, Ryhope Robert Richardson grammar, and Newton Aycliffe new county junior schools. Applications by above date to County Architect, Court Lane.

Mar. 31.—Gosforth U.D.C. Supply and erection of equipment for provision of 93 electric street lighting units. C. Wyld, Surveyor, Council Offices. Deposit £1 1s.

April 1. — Newcastle-on-Tyne. Electrical installation in £30,000 scheme for converting Jesmond Dene House into school for subnormal girls. City Architect, 18 Cloth Market. Deposit £2 2s.

April 2.—Edinburgh. Electrical installation in Ramsay Technical Institute. City Architect, City Chambers.

April 2.—Worsley U.D.C. Supply of electric cookers and washboilers, and also wiring for power and light in erection of 95 dwellings on Neighbourhood Unit No. 3. Applications to H. Lomax, Clerk of Council, Town Hall, Walkden, Manchester.

April 3.—Carlisle. Electrical installation at Harraby junior school. City Surveyor, Fisher Street.

April 3.—Sutton Coldfield T.C. Supply and erection of 63 mercury discharge lamps on concrete columns and brackets to Group A standard along Chester Rd. Borough Surveyor, Council Offices. Deposit £2.

April 4.—Amble (Northumb.) U.D.C. Electrical installation in 26 houses to be built on Links estate. Surveyor's Dept., Council Offices.

April 4.—Kilmarnock T.C. Supply of electric lamps required during year ending May 15, 1954. Burgh Surveyor's Office, 11 London Road.

April 4.—Peterborough. Lighting and power installations in 60 houses on Dogsthorpe North estate. Applications by above date to F. J. Smith, City Engineer and Surveyor, Town Hall. Deposit £2 2s. (Advertised in this issue.)

April 4.—Ryton (Dur.) U.D.C. Electrical installation in 44 houses at Greenside. Surveyor, Ryton Tower.

April 6.—Louth T.C. Floodlighting of parish church of St. James's at a cost of £450 (approx.). John T. Chenery, Town Clerk, Town Hall.

April 7.—Silsden U.D.C. Erection of 43 concrete standards and supply and fitting of lanterns for mercury street lighting to Class A standard. Council's Surveyor, Council Offices. (Advertised in this issue).

April 8.—Bath. Electrical installation in 19 flats at Kingsmead. City Planning Officer and Architect, 7 North Parade Buildings. Deposit £1 1s.

April 8.—Lisburn U.D.C. Supply and installation of four electric motors to pumping plant at Sewage Disposal Works, Tullynacross. Surveyor's Office, Town Hall.

April 8.—Manchester. Electrical installation in waste utilisation plants at Grimshaw Lane Cleansing Depot, Newton Heath. City Architect, Town Hall. Deposit £1 1s. (See March 19 issue.)

April 8. — Newcastle-on-Tyne. Electrical installation in 84 flats on Montagu estate and 72 flats on Blakelaw estate. City Architect, 18 Cloth Market.

April 10.—Belfast. Supply and erection of drainage pumping equipment including 600 g.p.m. pumps, motors, pipes, valves, lighting tackle, etc., for Victoria power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Feb. 26 issue.)

April 10.—Crosby T.C. Installation of sodium lighting to Group A in College and Coronation Rds., about 2,080 yd. Names to Borough Engineer and Surveyor, Town Hall, Waterloo, Liverpool 22.

April 11.—Swansea T.C. Contractors wishing to tender for electrical installation at Penlan Multilateral school should apply to Borough Architect, The Guildhall, by above date. Deposit £2. (Advertised in this issue.)

April 13.—Northampton T.C. Installation of street lighting comprising 69 columns with fluorescent lamps, and 54 with tungsten mercury lamps. Borough Engineer, Guildhall. Deposit £2 2s. (Advertised in this issue.)

April 13.—Portadown (N.I.). Electrical installation in new classrooms and alterations to existing installation at Portadown College. J. R. W. Murland, Consulting Engineer, 13 Wellington Place, Belfast. Deposit £3 3s.

April 14.—Islington B.C. Installation of fluorescent lighting, wiring, etc., in Essex Rd. library. Borough Engineer and Surveyor, Town Hall, Upper St., N.1. (See March 5 issue.)

April 24.—Manchester. Electrical installation in Openshaw College for Further Education in Whitworth St. City Architect, Town Hall. Deposit £1 1s. (See March 12 issue.)

April 24.—Oswestry R.D.C. Installation of electricity in 33 houses and part installation in 26 houses at Morda, Llanymynech and Ruyton-XI-Towns. C. H. W. Pugh, clerk, Council Offices, Castle View. Deposit £2 2s.

April 27.—Chatham (Kent). The Rochester, Chatham and Gillingham Sewerage Board require supply and installation of lighting and power cables, lamp standards, lighting fittings, junction boxes and ancillary equipment at Motney Hill Sewage Works, Rainham. Documents from consulting engineers, W. H. Radford and Son, Albion Chambers, Kent St., Nottingham. (Advertised in this issue.)

Date not known.—West Hartlepool T.C. Supply of electrical materials for housing department. Also electrical installation in conversion of Tunstall Court into annexe for technical college. Borough Architect, A. G. Sinclair, Municipal Bldngs.

No date stated—Hendon (Yorks) T.C. Installation of electricity in 22 bungalows on Westlands estate. Roper Spencer and Hall, Architects, Scale Lane, Hull. Deposit £1 1s.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horse Guards Avenue, S.W.1, quoting reference.*

April 21.—India. Directorate General of Supplies and Disposals invites tenders for a 1,000 kW rectifier and three battery charging motor generating sets. Director is at Shahjahan Rd., New Delhi. B.o.T. (Ref.: CRE 9577/53).*

April 23.—India. Supply of 27 100A train lighting dynamos with lamp resistance, motoring terminals, dynamo pulley, automatic cut in and out and battery changeover switch and over-voltage relay switch. Director General, Supplies and Disposals, Shahjahan Rd., New Delhi.

April 28.—New Zealand Post Office requires supply of 12 miles of textile covered, lead sheathed telephone cable as follows: Auckland, 1 mile; Wellington, 4½ miles; Christchurch, 4; and Dunedin, 2½. B.o.T. (Ref.: CRE 9118/53).*

April 28.—Uruguay. Supply of about 15,100 metres telephone trunk line cable between telephone exchanges with junction to short-wave radio broadcasting station. Usinas Electricas y Telefonos del Estado. B.o.T. (Ref.: CRE 10148/53).*

April 29.—Uruguay. Supply of 13,500 porcelain insulators for h.t. aerial lines for Usinas Electricas y los Telefonos del Estado. B.o.T. (Ref.: CRE 10262/53).*

April 30.—New Zealand. Supply of 200 miles p.v.c. cable, insulated 2-wire (internal wiring) as follows: Auckland, 68 miles; Wellington, 107; Dunedin, 13; Christchurch, 12. Director-General (Stores Div.), G.P.O., Wellington.

April 30.—South Africa. Supply of three centrifugal pumping units with squirrel cage induction type electric motors suitable for 380 V 3-phase 50 c/s a.c. supply, for City of Johannesburg. B.o.T. (Ref.: CRE 9527/53).*

May 6.—South Africa. Supply of two dual ratio transformers, each having continuous maximum rating of 30,000 kVA at higher ratio of transformation and 15,000 kVA at lower ratio. Capetown City Electrical Engineer, Electricity House, Strand St., Capetown. B.o.T. (Ref. CRE 9644/53).*

May 14.—India. Supply and erection of 22 kV and 6·6 kV switchgear and accessories at Kussara, Worli, Kingsway and Mahim receiving stations for Bombay Electric Supply and Transport Undertaking. B.o.T. (Ref. CRE 10217/53).*

June 10.—New Zealand. State Hydro Electric Dept. requires supply of one spare runner wheel for an auxiliary turbine at Highbank power station. Dept. is at P.O. Box 8025, Wellington. B.o.T. (Ref.: CRE 9547/53).*

Your Queries — Answered

Waffle irons, makers of? B.C.—S.L.R. Electric, Ltd., 58 South Harrow Viaduct, South Harrow. (25286)

"Lo-Vo-Lite" lighting units, makers of? B.C.—Igranic Electric Co., Ltd., Bedford. (25286)

"CA" cookers, makers of? H.H.—Clifton Appliances, Lytham, Lancs. (25295)

"Sunbeam Mixmaster" mixers, suppliers of? E.B.—S. Guiterman and Co., Ltd., 120 Jamaica Rd., London S.E.1. (25306)

B. E. White contactors, suppliers of? T.B.—B. E. White, Brantwood Rd., London N.17. (25312)

"Universal" coffee percolators, agents for? A.W.—L. G. Hawkins and Co., Ltd., 30-35 Drury Lane, London W.C.2. (25319)

Forged aluminium suspension clamps to B.S. 1472:1951.—Try Aluminium Wire and Cable Co., Ltd., 37 Thurloe St., London S.W.7. (25326)

Senior Lighting Co., Ltd., address of? L.B.—The appliances supplied by this firm have been taken over by Tide Electrical Co., Ltd., 34-36 High St., Southall, Middx. (25338)

The above are selected from questions we have answered this week. If you have a query, send it to us.

CONTRACTS PLACED

Blackpool T.C. Supply and erection of mercury arc rectifier, transformer and switchgear equipment for Bispham substation, Hackbridge and Hewittic Electric Co., Ltd., £15,890.

Doncaster T.C. Electrical installation in 250 houses on Cantley estate, F. Sinclair, Ltd., £8,319.

Finchley B.C. Provision of lanterns and control gear for lighting in Bishop's Ave., British Thomson-Houston Co., Ltd., £1,140; supply of columns, Concrete Utilities Ltd., £1,120.

Hull. Electrical installation in Eastcourt primary school, T. A. Garness, Ltd., same in 74 dwellings in Needlers Sawmill site, Reliance Electric Co.; also in 185 houses in Sutton No. 2 site, and 32 houses on Bilton Grange estate, Booker and Tarran, Ltd.

Leek (Staffs). Rewiring of stores and laundry at St. Edwards Hospital, Cheddleston, Tomlins Ltd., £1,734.

London. Electrical installation in Gordonbrook primary school, Holliday and Son (Electrical) Ltd., £3,664; same in Rotherfield and Forster primary schools, C. J. Ferguson and Sons Ltd., £2,701 and £3,237 respectively.

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	285 0 0	—
LEAD, good soft pig (foreign)	93-93½	108 0 0
" " " "English" quality ...	94½-95	
TIN (99·99·76%) ... ... (Cash)	942-943	—
" (3 months)	936½-937	—
ALUMINIUM, commercial purity (del.)	166 0 0	—
ZINC	80½-80¾	88 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	51 10 0	—
Mild Steel Tape (0·04 in.)	39 15 0	—

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Fenton Duddy and Co., Ltd., Borough Chambers, St. Petersgate, Stockport. To construct and carry on railways, tramways, gasworks, electricity works, waterworks, and to carry on business of engineers, etc. Cap.: £5,000. Dirs.: F. Duddy and Mrs. M. Duddy.

G. W. Henry, Ltd., 59 Park Rd., Crosland Moor, Huddersfield. To take over business of electrical engineer and contractor carried on at Huddersfield by Geo. W. Henry. Cap.: £1,000. Dirs.: G. W. Henry and Mrs. D. K. Henry.

J. W. Henry and Co., Ltd., 1 Christina Terrace, Hotwells, Bristol. To take over business of a heating, ventilating and general engineer carried on at Hotwells, Bristol, by John W. Henry. Cap.: £3,000. Dirs.: J. W. Henry (man. dir.) and Dorothy L. Henry.

Mackie Electrical Generators, Ltd., 129 Lambeth Rd., S.E.1. Cap.: £100. Dirs.: not named. Subs.: J. R. Jenner and H. L. Armstrong.

Perfection Parts, Ltd. General engineers and manufacturers of electric, electronic, mechanical, aeronautical and marine parts or equipment, etc. Cap.: £100. Dirs.: D. H. McBean, 51 Tamworth Park, Mitcham, Surrey, and C. W. N. Fentiman, 27 Crescent Way, S.E.4.

W. H. Phillips and Co. (New Eltham), Ltd., 358 Footscray Rd., New Eltham, S.E.9. Retailers of wireless and television sets, apparatus and components, etc. Cap.: £5,000. Dirs.: W. H. Phillips, F. W. Phillips and E. A. Phillips.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Reprovox. 714,210. Class 9. Electric sound recording and reproducing instruments and apparatus. Marconi International Marine Communication Co., Ltd., 336 Strand, W.C.2.

Regon. 709,064. Class 9. Electric terminals, conduit material and earthing tags. Regon Industries Ltd., 155/159 Miller St., Birmingham 6.

Sempun. 707,481. Class 9. Magnetic apparatus for the detection of flaws or defects in magnetisable material, etc. R. I. Minchom, 19 Golders Rise, N.W.4.

Sonoscribe. 713,268. Class 9. Electrical and magnetic sound recording and reproducing apparatus. Hartley Electromotives Ltd., 1a Harrington Rd., S.W.7.

Sterlene. 712,686, and **Sterline.** 712,687. Class 9. Insulated electric wires and cables. Sterling Cable Co., Ltd., Sterling Works, Aldermaston, Berks.

Teledictor. 710,507. Electrical apparatus in Class 9. Teledictor Ltd., 214 Birmingham Rd., Dudley, Worcs.

Tele-magni. B 713,083. Class 9. Television magnifying lenses. Plastic Products (Golcar), Taylor St., Golcar, near Huddersfield.

Televistr. B711,623. Class 9. Television receivers and projection apparatus. R. F. E. O'Connor, 786 Mansfield Rd., Woodthorpe, Nottingham.

Trix. 713,738. Class 9. Sound recording and reproducing apparatus, etc. Trix Electrical Co., Ltd., 1/5 Maple Place, Tottenham Court Rd., London W.1.

Westruk. 714,422. Class 9. Electrical apparatus for supplying d.c. from an a.c. source. Westinghouse Brake and Signal Co., Ltd, 82 York Way, N.1.

Unity. B708,374. Class 11. Installations for heating, lighting, etc. Unity Heating Ltd., Chilworth Manor, Southampton.

TRADE NOTES

Arrangement. Albion Motors, Ltd., of Glasgow and Diesel Equipment Ltd., of Uxbridge, have made an arrangement whereby the latter company will build exclusively a.c. and d.c. generating sets incorporating the Albion EN286 engine.

New Products. Winston Electronics Ltd., 1 Park Rd., Hampton Hill, Middx., have formed a new Transformer Division. This is the result of an amalgamation between that firm and Edlin Electrical Co. The latter concern will still make most of the transformers, Winstons being the sole distributors. Transformers up to 300 kVA oil-filled are available.

Change of Address. The sales administrative offices of Vactric Ltd. have been moved from Newhouse, Motherwell, to 149 Regent St., W.1.

BUSINESS PROSPECTS

Acton (Middlx.) T.C. Following demolition work, it is proposed to build 226 flats in Bollo Lane, and Bollo Bridge, Hanbury and Osborne Roads.

Airdrie T.C. Approval sought for erection of police buildings to replace existing H.Q. and Burgh Court Hall in Anderson Street.

Alnwick U.D.C. Plans in hand for erection of about 250 houses in next two years.

Ballymena R.D.C. Erection of 96 houses in Station Rd., Cullybackey. Ogilby and McCutcheon, Chartered Surveyors, 5 Lombard St., Belfast.

Barnard Castle (Dur.) R.D.C. Construction of 46 houses at Evenwood and 32 at Gainford. Council's Architect, J. Lawton, 45 Galgate.

Barry T.C. Scheme approved for erection of 58 dwellings on Weston Hill site.

Basingstoke. The erection of £49,500 factory in Kingsclere Rd. for Lansing Bagnall Ltd. Architects are C. W. Glover and Partners, 54 Victoria St., S.W.1.

Belfast. Erection of 51 flats on Kansas Ave. site. Housing Architect, 94 Chichester St.

Berkshire. Construction of secondary school in Faringdon Rd., Abingdon. County Architect, Wilton House, Parkside Rd., Reading.

Bexhill T.C. It is proposed to build 176 houses in Southlands Road.

Bolton. Plans in hand for new Oldhams Lane primary school; and application to be made for sanction to borrow £160,000 for erection of phase 1 of Breightmet secondary school.

Brentford. MacLeans Ltd., propose a £50,000 factory extension on Great West Rd. Jantzen Ltd., are also planning similar work along the same road.

Brighton. Construction of factory on Hollingbury estate. D. J. Howe, Borough Surveyor, 26-30 King's Rd.

Carlton U.D.C. Erection of 36 bungalows at Cedling. J. R. Campbell, Engineer and Surveyor, Council House, Burton Road.

Cudworth (Yorks) U.D.C. Construction of 82 dwellings on Darfield Rd. site. J. Hinchliffe, Engineer and Surveyor, Council Offices, Barnsley Road.

Dartford. Final plans submitted for first instalment of junior dept. of Wentworth primary school costing £53,000.

Dartmouth T.C. Site works to start soon for 47 dwellings on Townstal estate.

Doncaster. Coal Industries Housing Assoc. plan to erect 1,300 houses in the district. Also town council has received permission to borrow £5,776 for replacement of gas fires by electric fires in 339 houses.

Durham. Work expected to begin this year on erection of new grammar school at Consett.

Enfield U.D.C. Layout plans prepared for erection of 141 houses and 90 flats on Manor Farm site.

Glasgow. Erection of 150 flats on Garthamlock site. Housing Dept., 20 Trongate.

Grimsby T.C. Tenders to be invited shortly for erection of 44 houses in Heneage Rd. and Granville Street.

Haslemere (Surrey) U.D.C. Layout plans approved for erection of 78 houses in Lion Lane.

Islington. Plans prepared for St. Mark's primary school in Sussex Way.

Jarrow T.C. Twelve shops to be built in Ormonde St. area. Borough Engineer, H. W. T. Perkins, Town Hall.

Leeds. Tenders may soon be invited for erection of 146 dwellings on Seacroft, Beckett Park and Belle Isle estates. Application to be made to borrow £286,185 for 210 dwellings on Swarcliffe estate, £265,475 for 194 dwellings on Seacroft estate, and £429,360 for 318 dwellings on Swarcliffe estate.

Littlehampton. Site is being sought by D. A. Daniels and Co. Ltd. for construction of factory.

Londonderry. Intermediate schools are to be built at Coleraine, Magherafelt and Limavady, and primary schools at Eglinton, Ballyrashone and Millburn, as part of 1953-54 building programme.

Loughborough T.C. It is proposed to build 260 houses on Ashby Rd. estate.

Lowestoft T.C. Whitton estate is site for further 32 houses and the Gunton estate for further 36 houses.

Luton R.D.C. Scheme approved for 30 houses each at Tottenhoe and Toddington, 24 at Eaton Bray, and 20 each at Kensworth, Barton and Caddington village.

Maidstone R.D.C. Construction of 22 houses at Yalding, 18 at Marden, and 30 at Coxheath. Engineer and Surveyor, Council Offices, 26 Tonbridge Road. Also c.c. recommended to approve erection second junior dept. of Shepway primary school.

Melton Mowbray U.D.C. Further 100 houses to be built in district.

Neston (Ches) U.D.C. Erection of 84 houses on Liverpool, Raby Rd. scheme. G. D. Walford and Partners, Quantity Surveyors, 20 Castle St., Liverpool.

Newcastle-on-Tyne. It is suggested that three-storey flats involving about 840 dwellings, should be erected at Longbenton, instead of multi-storey flats.

North Shields. Plans being prepared for sweet factory, offices etc. in Bird St. for Scott and Son.

Poole T.C. Layout plans approved for erection of 444 houses on Alderney West estate.

Rochdale T.C. Tenders may soon be invited for erection of 98 dwellings on various sites.

Salford. Erection of Salford grammar school on Claremont site. Taylor and Young, Architects, 195 Oxford Rd., Manchester 13.

Southend T.C. Approval sought for completion of workshops in London Rd., estimated to cost £182,576.

South Shields T.C. Offers received from Essoldo Circuit Ltd. and owners of Regent cinema to negotiate for site in Centenary Ave. for erection of cinema.

South Shields T.C. Improvements to further 200 houses on Cleadon Park estate include £2,289 on electrical work.

Stockton-on-Tees T.C. Erection of new Roseworth junior school in Durham Rd. T. C. Hartley, Architect, 28 The Square.

Stretford T.C. Council may soon invite tenders for erection of 57 flats on Milton Close site.

St. Albans R.D.C. Erection of 40 dwellings in Saxon Rd., Wheathampstead. Architect, 43 Upper Lattimore Road.

Walton and Weybridge U.D.C. Erection of 48 flats in Thrupps Lane, Hersham. Engineer and Surveyor, Council Offices, Walton-on-Thames.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Anderson Angell and Co. Ltd., London W.2. John Melville Clarke, senior official receiver and liquidator, Inveresk House, Strand, W.C.2, released as from Mar. 7.

J. W. Collins and Sons Ltd., Hassocks, Sussex. N. W. Osborne, of 11-12 Finsbury Sq., London E.C.2, has been appointed liquidator with a committee of inspection.

John Ferguson Associates Ltd. Liquidator, John Melville Clarke, Inveresk House, Strand, W.C.2, released as from Mar. 7.

J. S. and B. G. Foreman (Portsmouth) Ltd. Liquidator, Frank Barter of 10 Victoria Rd., Southsea, released as from Feb. 2.

Haylett Bros. Ltd. Resolution for voluntary winding-up passed at meeting on Mar. 7, when R. H. Haylett of 29 Blake Rd., Gt. Yarmouth, was appointed liquidator.

Radio-Clinics Ltd., Ruislip, Middlx. J. M. Clarke, senior official receiver and liquidator, Inveresk House, Strand, W.C.2, released as from Mar. 7.

Renas Engineering Co. Ltd. At meeting on Mar. 5, resolution passed for voluntary winding-up. Liquidator is P. O. Davis, 120 George St., Croydon, Surrey.

J. E. Swann and Co. Ltd. Resolution for voluntary winding-up passed at meeting on Mar. 6, when N. W. Osborne, C.A., 11-12 Finsbury Sq., E.C.2, was appointed liquidator.

Robinson and Shand, electrical engineers of 115 Baden Powell Rd., Chesterfield. Partnership between Amos Robinson and Francis W. Shand, dissolved as from Feb. 14. Debts received and paid by F. W. Shand, who will continue business.

M.P. Stainless Products Ltd. Meetings of creditors and contributories will take place at Inveresk House, Strand, W.C.2, on April 1, at 10.15 a.m. and 10.45 a.m. resp.

Power Specialities Ltd. Resolution passed at meeting on Mar. 9 for voluntary winding-up, when F. F. Leach, 49 St. James's St., S.W.1, was appointed liquidator.

Atlantic Appliances Ltd. At meeting on Mar. 18, resolution was passed for voluntary winding-up. David A. Jacobs, C.A., 74 Newman St., W.1, was appointed liquidator, to whom creditors are asked to send particulars by April 23.

BANKRUPTCY ACTS

Receiving Order

Boston. Peter A. Armitage, electrical engineer, lately of 9 Spain Court, Boston. Date of receiving order, Mar. 12.

Public Examination

Sheffield. Arthur S. Bennett, electrical contractor trading at South View, Webb's Ave., Stannington. Public exam. will take place at County Court Hall, Bank St., Sheffield, on April 30 at 2 p.m. First meeting was held last Tuesday.

Order on Application for Discharge

Croydon. Hugh H. P. Giles, electrical retailer trading as H. Giles and Son at 30 and 144 Brigstock Rd., Thornton Heath and at 54 Penge Rd., S. Norwood. Discharge granted subject to bankrupt consenting to judgment being entered against him by official Receiver for £52 and £1 10s. costs to be paid by instalments of £1 p.w. beginning Feb. 13.

MEETINGS TO NOTE

THURSDAY, MAR. 26

I.E.E. (London). — "Studies of Telephone Traffic with Aid of a Machine." S. W. Broadhurst and A. T. Harmston. Savoy Place, W.C.2, 5.30 p.m.

I.E.S. (Bradford Group).—Fluorescent Forum at Y.E.B., 45-53 Sunbridge Rd., 7.30 p.m.

E.P.E.A. (S.W. Tech. Group).—Annual meeting and film show. Elect. House. Colston Ave., Bristol, 7.15 p.m.

FRIDAY, MAR. 27

I.E.E. (London Educ. Circle).—Discussion on "Courses in Electrical Engineering in R.N." Capt. (L) L. S. Bennett, R.N. Savoy Place, W.C.2, 6 p.m.

MONDAY, MAR. 30

I.E.E. (S. Midland Centre).—Discussion on "Electric Heating." E. H. Cox. James Watt Inst., Gt. Charles St., Birmingham, 6 p.m.

I.E.E. (London) Discussion on "Use and Abuse of Research." S. Whitehead. Savoy Place, W.C.2, 5.30 p.m.

TUESDAY, MAR. 31

I.E.E. (N. Midland Centre).—"275 kV Developments on British Grid System." D. P. Sayers, J. S. Forrest and F. J. Lane. University of Leeds.

I.E.S. (Cardiff Centre).— "Development of Lamps other than Tungsten." E. J. G. Beeson. S. Wales Board, 5.45 p.m.

I.E.S. (Leeds Centre).—Annual meeting. "Lighting and Vision as Age Advances." H. C. Weston. 24 Aire St., 6.15 p.m.

E.A.W.—"Lighting in the Home." Miss Wardlaw, 2 Savoy Hill, W.C.2, 2.30 p.m.

INSTN. OF ENGRNG. INSPECTION (S. West).—"Precision Engineering Measurement." W. H. Foster. Grand Hotel, Bristol, 7.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Scottish).—"Steam Boiler Performance Testing and Insurance." R. H. Brown. 351 Sauchiehall St., Glasgow, 6.30 p.m.

WEDNESDAY, APRIL 1

I.E.S. (Edinburgh Centre).—Annual meeting at 357 High St., 7 p.m.

I.E.S. (Newcastle Centre).—Annual meeting at Roadway House, 8 Oxford St., 6.15 p.m.

I.E.S. (Swansea Group).—"Electrical and Radiation Characteristics of Discharge Lamps for Industrial Lighting." E. J. G. Beeson, Minor Hall, Y.M.C.A., 6 p.m.

I.E.E. (Tees-side Sub-centre).—Annual meeting. "Automatic Winding in Mine Shafts." B. L. Metcalfe and G. Cuttle. Cleveland Scientific and Tech. Inst., Corporation Rd., Middlesbrough, 6.30 p.m.

THURSDAY APRIL 2

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—"Principle and Applications of Telescribe." C. A. Gilbert. Dept. of Natural Philosophy, The University, Edinburgh.

INCORP. PLANT ENGRS. (Peterborough).—"Industrial Fire Protection." W. H. Tuckey. Eastern Gas Board, Church St., 7.30 p.m.

TUESDAY APRIL 7

INCORP. PLANT ENGRS. (Edinburgh).—"Elementary Industrial Electronics." J. H. Jones. Heriot-Watt College, 7 p.m.

EXHIBITION DIARY

Factory Equipment. Opened on Monday at Royal Horticultural Society's New Hall, Westminster. Closes on Mar. 27.

Daily Mail Ideal Home. Closes on Saturday, Mar. 28.

Electrical Engineers' Second National Exhibition opened yesterday at Earls Court, continuing until Mar. 28.

Physical Society. 37th Show at Imperial College, S. Kensington. Opens on April 13 and closes on April 17.

ENGLISH ELECTRIC COMPANY

Outstanding Achievements of Record Year

THE 34th annual general meeting was held on March 19, in London. Sir George H. Nelson, F.C.G.I., M.I.Mech.E., M.I.E.E. (Chairman and Managing Director), in the course of his speech said: Our production has again been substantially increased and our deliveries are £11 million greater than last year, and the orders remaining on our books stand at a level which will enable the Company to reach in 1953 and 1954 a volume as high as has been reached in 1952. Orders in export markets reached the very high level of 55 per cent. of the total business obtained for our normal products.

The consolidated profit before taxation has risen by £716,893 to £4,359,034, but 67% of this total, namely £2,909,516, goes in taxation.

By the strenuous efforts of the whole of a great organisation here and throughout the world to expand both sales and output, we succeeded in 1952 in increasing our consolidated profit before taxation by nearly 20%, having similarly increased our turnover. What is the result of this achievement—an addition of less than 7% to the net profit after tax.

Reviewing the outstanding engineering events in 1952, the Chairman said: We can now offer deliveries of certain sizes of steam turbines in 18 months to two years from the further productive capacity we have created to enable us to increase our output as and when the demand arises.

The year has been a notable one for our hydro-electric equipment. During the year there has been a further expansion over previous years of our sales and production of diesel engines for all purposes. The company's industrial gas turbine division completed tests on a 6,500 h.p. unit and ran further tests on prototype units for two 20,000 kW sets. The latter, we believe, are of higher power than any previously projected in this country. The continued and increasing demand for the company's traction products brought a record volume of orders for 1952, mostly from overseas railways.

Outstanding among the steel works equipment commissioned is the first Sendzimir cold strip mill in the U.K. to have electrical drives.

Following the development of a new design of electrical propulsion equipment, we are currently engaged on a contract to supply a number of sets for installation in Her Majesty's submarines.

During the year we have supplied large numbers of EHV air blast circuit-breakers which is a striking testimony to our pioneer development work in the switchgear field. Our business in large transformers both at home and abroad continues at a very high level, including the despatch to site of the first 275 kV transformer to be supplied for service in this country.

Industrial machines: Following our policy of supporting standardisation wherever it may be of advantage to the user we were among the first to offer totally enclosed fan-cooled motors to the new draft British Standard dimensions.

The report was adopted.

MARCONI'S WIRELESS TELEGRAPH

Consistent Progress

THE fifty-fifth annual general meeting of Marconi's Wireless Telegraph Company, Limited, was held on March 19, in London. Sir George H. Nelson, F.C.G.I., M.I.Mech.E., M.I.E.E., chairman, in the course of his speech, said: It gives me great pleasure to report that we have again greatly increased our turnover over 1951, our deliveries being increased by £3,600,000, which has yielded a correspondingly greater trading profit.

The profit after deducting all charges is £601,704 which is £245,323 greater than in 1951. Taxation is £212,813 heavier at £384,527; thus the net profit after allocating a further sum of £25,000 to the depreciation equalisation reserve, is £192,177, which means that from the company's greatly increased turnover the net profit is only £32,510 more owing to increased taxation, chiefly due to Excess Profits Levy. Your directors recommend a dividend of 7%, less tax.

In spite of demands for re-armament our shipments to home and overseas clients of normal products reached a new high level last year.

Today, radio telegraphy and radio telephony are commonplace. There are, however, vast areas of the globe without proper communication systems, and where radio is the most practical solution. Our survey teams of engineers have completed operations for new systems in several territories and are active in various parts of the world.

Marconi airborne radio equipment has a deservedly high reputation. For on the Saro "Princess" flying boat, the de Havilland "Comets" Mark I and II, and the Bristol "Britannia", Marconi equipment has been selected. The Royal Australian Air Force have ordered our airborne equipment for their new "Canberra" bombers, the Royal New Zealand Air Force for their "Sunderlands," "Bristol Freighters" and "Devons," the R.C.A.F. for their Mark I "Comets."

British manufacturers of jet aircraft, as well as many overseas Governments, have recognised the unique capabilities of our very high frequency direction finding equipment, and have installed or ordered it for their airfields.

In sound broadcasting we have received orders for transmitters from the B.B.C., Uganda, the Gold Coast, Nigeria, Sarawak, Cyprus and the Sudan. Outside the Commonwealth, we have supplied transmitters to Iceland and Sweden and have a contract for two large transmitters for Denmark.

We continue to play a great part in the television field in the U.K., but the television event of the year for us was the opening of the Canadian Broadcasting Corporation's first large television studio centres in Montreal and Toronto. Both were equipped by us, and the C.B.C. has since entrusted us with the supply of the television transmitter for Ottawa, to be installed next autumn.

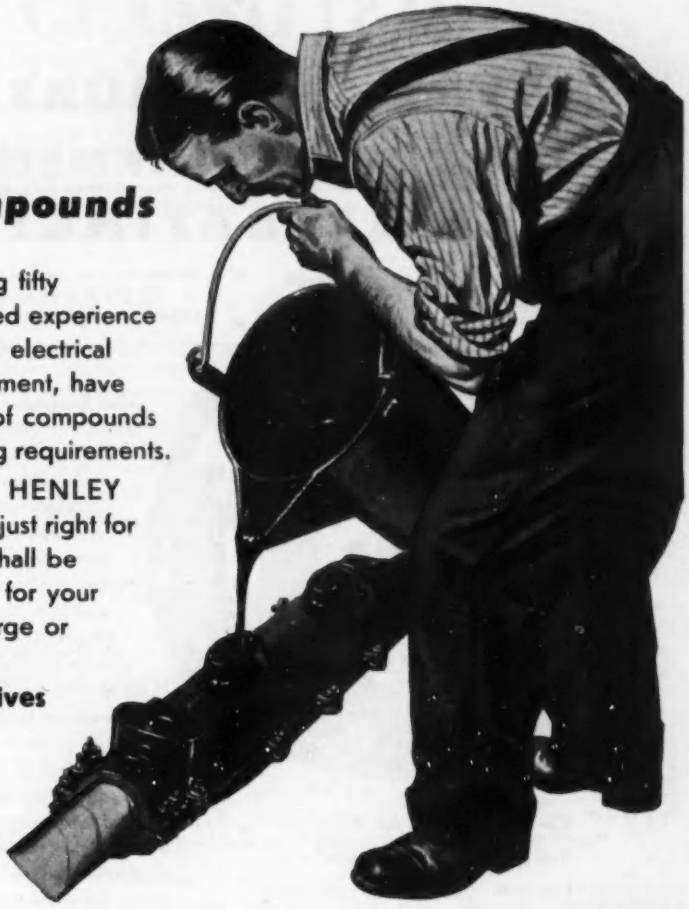
At home the B.B.C. continues to show confidence in our television equipment. Television orders have been received from Italy and Venezuela and installations have been completed in Thailand. The report was adopted.

Use the right compounds

HENLEY'S, during fifty years of specialized experience in the design of electrical distribution equipment, have evolved a range of compounds to meet all jointing requirements.

There's always a HENLEY Compound that's just right for the job and we shall be pleased to quote for your requirements—large or small.

Catalogue *57* gives full details.



2nd SUPERVISING ENGINEERS EXHIBITION
Earls Court Mar. 25-28
VISIT
STAND No. 62

***Use* HENLEY**

INSULATING COMPOUNDS

for Electrical Distribution Equipment

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

HOW MANY HOURS HAS YOUR EQUIPMENT BEEN OPERATING?

The Sangamo Model S.16. Hour-meter, with cyclometer type dial.

The Sangamo Model S.16 Hour-meter registers with infallible accuracy the number of hours during which an electrical circuit has been functioning. It is of the synchronous motor driven type, for use on controlled frequency supply. Normally supplied for 200/250v. 50 cycle mains, it can be ordered with cyclometer or pointer type dial and registers every 1/10th hour up to a total of 9,999·9 hours or, alternatively, every hour up to a total of 99,999 hours. The model S.16 is widely applied by *users* of important equipment to indicate that the time for a period overhaul has been reached—or by *suppliers* of such equipment to check the user's estimate of the number of hours which the plant will be in operation. Diameter $4\frac{1}{2}$". Depth $3\frac{3}{8}$". Further details gladly supplied on request. Retail price in U.K. £5.3.3.

SANGAMO WESTON LIMITED

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Tel: Enfield 3434 (6 Lines) & 1242 (4 lines) Grams: Sanwest, Enfield

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

COUNTY BOROUGH OF SWANSEA

Penlan Multilateral School, Penlan, Swansea

TENDERS FOR ELECTRICAL INSTALLATION

FIRMS wishing to tender for the Electrical Installation at Penlan Multilateral School now in course of erection at Penlan, Swansea, are invited to submit their applications to the Borough Architect, The Guildhall, Swansea, on or before Saturday, April 11, 1953.

Plans, Specifications and Conditions of Contract can be obtained on application and deposit of £2, provided the applicant gives satisfactory evidence of having previously carried out work of a similar character.

The deposit will be refunded after delivery of a bona fide Tender (which is not subsequently withdrawn) and the return of all documents.

No guarantee is given that the lowest or any other Tender will be accepted.

T. B. BOWEN,
Town Clerk.

The Guildhall,
Swansea.
March 19, 1953. (D 267)

CITY OF PETERBOROUGH

THE COUNCIL invites tenders from recognised electrical contractors for the electric lighting and power installations to 60 permanent houses on the Dogsthorpe North Estate, Peterborough.

Drawings, Specifications and Forms of Tender may be obtained on application to Mr. F. J. Smith, M.B.E., A.M.I.C.E., City Engineer and Surveyor, Town Hall, Peterborough.

Applications, before noon on Saturday, April 4, 1953, should be accompanied by a cheque for the value of £2 2s., made payable to the Peterborough City Council, which will be returned on receipt of a bona fide tender or the return of the documents.

The Council does not bind itself to accept the lowest or any tender.

C. PETER CLARKE,
Town Clerk.

Town Hall,
Peterborough.
March, 1953. (D 268)

NORTHAMPTON COUNTY BOROUGH

CONTRACTORS wishing to tender for the INSTALLATION of STREET LIGHTING in the Borough of Northampton, comprising 69 columns with fluorescent lamps and 54 columns with tungsten-mercury lamps, should apply to the Borough Engineer, Guildhall, Northampton, enclosing crossed cheque for two guineas, payable to Northampton Corporation. This sum will be returned if a bona-fide tender, not subsequently withdrawn, is received by me by Monday, April 13, 1953.

C. E. VIVIAN ROWE,
Town Clerk.
(D 282)

SILSDEN URBAN DISTRICT COUNCIL

ELECTRIC STREET LIGHTING

TENDERS are invited for the erection of 43 CONCRETE STANDARDS and the supply and fitting of LANTERNS for mercury vapour lighting to Group A standard (25 feet mounting).

Forms of tender and specifications may be obtained from the Council's Surveyor at the Council Offices, Silsden, via Keighley, and should be returned to me not later than April 7, 1953.

J. WAKEFIELD,
Clerk of the Council.
(D 284)

ROCHESTER, CHATHAM AND GILLINGHAM JOINT SEWERAGE BOARD

SUPPLY AND INSTALLATION OF ELECTRICAL EQUIPMENT

THE ABOVE Joint Board invite tenders for the supply and installation of lighting and power CABLES, LAMP STANDARDS, LIGHTING FITTINGS, JUNCTION BOXES and other ancillary equipment at the Motney Hill Sewage Disposal Works, Rainham, Kent.

Plans, specification and form of tender may be obtained from the Joint Board's Consulting Engineers, Messrs. W. H. Radford and Son, Albion Chambers, Kent Street, Nottingham.

The Joint Board do not bind themselves to accept the lowest or any tender.

The successful tenderer will be required to undertake the work as a nominated sub-contractor to the general contractor.

Tenders, in plain sealed envelopes endorsed "Tender for Electrical Items," must be delivered to the undersigned not later than Monday, April 27, 1953.

J. B. HARVEY,
Secretary and Engineer.

13 New Road,
Chatham, Kent.
March 19, 1953. (D 266)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London allowance, and conditions of service in accordance with N.J.B. Agreement, Schedule "A" or "D."

ASSISTANT SHIFT CHARGE ENGINEER

Grove Road Generating Station

Qualifications: Preferably to Higher National Certificate with experience of generating station operation. Salary, Class "F," Grade 10, £637 7s. p.a.

STATION SHIFT CONTROL ENGINEER

Barnes Generating Station

Candidates should have good general education and technical training. Previous experience in operation and control of e.h.t. switchgear essential, together with knowledge of d.c. and a.c. lt. distribution and rotary convertors. Salary, Class "C," Grade 10, £527 2s. p.a.

SENIOR OR ENGINEERING DRAUGHTSMAN (ELECTRICAL)

Divisional H.Q.

Qualifications: Technical training with Higher National Certificate. Experience in general design, assembly and layout of h.t. and l.t. switchgear, transformers, cables and lighting as required in large stations. Salary: Grade 5, £595 7s.-£704 11s., or Grade 6, £458-£586 7s. p.a.

Applications may be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generating House, Great Portland Street, W.1, and be received not later than 14 days of the appearance of this advertisement. (D 270)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 4 (Leeds) Sub-Area

SECOND ASSISTANT ENGINEER
(Meters, Testing and Protection)

Applicants should be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

The successful applicant will be responsible to the Senior Assistant Engineer for administration of a Class A Meter Test Station, the preparation of metering schemes for large consumers and all H.V. metering schemes in the Sub-Area. Experience of fault location will be an additional qualification.

Salary: N.J.B. Class "K" Grade 7, £869/907 per annum.

SECOND ASSISTANT DISTRICT ENGINEER
(Morley)

Applicants must have had a sound practical training and considerable experience in the construction, operation and maintenance of H.V., L.V., overhead and underground distribution networks, substation plant and ancillary equipment and be capable of preparing schemes associated with large city networks.

Applicants should be Corporate Members of the Institution of Electrical Engineers or possess equivalent qualifications.

Candidates should be prepared to reside in the district and undertake standby duties.

Salary: N.J.B. Class "J" Grade 7, £817/852 per annum.

GENERAL ASSISTANT ENGINEER
(Meters, Testing and Protection)

Applicants should be Graduate Members of the Institution of Electrical Engineers or possess exempting qualifications. Some experience of commissioning and maintenance of protective gear will be an advantage.

Salary: N.J.B. Class "K" Grade 13, £583/605 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Leeds, not later than April 9, 1953.

No. 5 (Wakefield) Sub-Area

(Barnsley District)

DISTRICT COMMERCIAL ENGINEER

Applicants must be Corporate Members of the Institution of Electrical Engineers and have had wide and responsible experience in the development of electricity supplies for all purposes. The successful applicant will be responsible to the District Manager for the control and administration of all commercial work in the district, including electrical contracting, negotiations with industrial consumers and service centres.

Salary: N.J.B. Class "F" Grade 4, £850/887 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, not later than April 9, 1953.

No. 6 (Hull) Sub-Area

(Driffield District)

JUNIOR ENGINEER

Applicants should be Graduate Members of the Institution of Electrical Engineers or hold either the Higher National Certificate in Electrical Engineering or an equivalent qualification. They should have had training in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems.

Salary: N.J.B. Schedule Class "D" Grade 15/14, £390/423 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than April 9, 1953.

No. 7 (Grimsby) Sub-Area

(Gainsborough District)

FIRST ASSISTANT DISTRICT ENGINEER

Duties will be to assist the District Engineer in the control, construction, operation and maintenance of the H.V. and L.V. overhead and underground networks throughout the district. Applicants should be preferably Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

Salary: N.J.B. Class "D" Grade 5, £714/731 per annum.

GENERAL ASSISTANT DISTRICT ENGINEER

Applicants should be preferably Graduates of the Institution of Electrical Engineers or hold either the Higher National Certificate in Electrical Engineering or an equivalent qualification. They should have had experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems.

Salary: N.J.B. Class "D" Grade 11, £500/516 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, not later than April 9, 1953. (D 260)

BOROUGH OF ILFORD

STAFF APPOINTMENTS

Borough Engineer's Department

ELECTRICAL ENGINEERING ASSISTANT
Grade APT. III.

APPLICANTS should preferably be Corporate Members of the Institution of Electrical Engineers, and have served an indentured apprenticeship in electrical engineering with a reputable firm, be capable draughtsmen with good experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work. Duties will include preparation of drawings, inspection of premises, supervision of installations and general routine work in the electrical section.

The salary will be in accordance with A.P.T. Grade III, £525 by £15 to £570 per annum, plus London Weighting.

The appointment will be whole-time, superannuable, subject to one month's notice on either side, to the National Scheme of Conditions of Service and to medical examination.

Applications, on forms obtainable from the Town Clerk, Town Hall, Ilford, Essex, should be submitted not later than April 7, 1953.

N.B.—London Weighting is £10 per annum at ages 16 to 20 years, £20 per annum ages 21 to 25 years, and £30 per annum ages 26 years and over. (D 235)

NORTH EASTERN ELECTRICITY BOARD

Wear Sub-Area

APPLICATIONS are invited for the appointment of DEMONSTRATOR, Durham District. Applicants should have a certificate of a recognised domestic science training college and/or the E.A.W. Certificate, preferably the latter; also considerable experience as a demonstrator or assistant demonstrator in the electricity supply industry.

Salary, Grade 1, £380-£470. Annual increments of £20 up to £420; beyond £420 increments subject to certificate of competence. N.J.C. conditions of service.

Applicants outside the industry must apply to local employment exchange. Applications stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), the North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne, within ten days of the appearance of this advertisement. (D 272)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER required in the Technical Section at No. 1 Sub-Area Headquarters, 24 Hatton Garden, Liverpool 3. Salary, £616 to £646 p.a. (N.J.B. L/13).

Applicants should have had a thorough technical training and possess technical qualifications to enable them to become Chartered Electrical Engineers. Practical experience in the commissioning of protective systems will be an advantage. Duties of the post include the testing of relays and protective gear, h.v. and transformer testing, including site testing.

The appointment is superannuable and subject to medical examination.

Application should be made on the standard application form obtainable from the Manager, No. 1 Sub-Area, above address. Quote reference 125A. Closing date April 6, 1953. (D 234)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

GENERAL ASSISTANT ENGINEER (Electrical) is required in the Generation Construction Department at Wolverhampton. N.J.B. service conditions, superannuable appointment, salary in accordance with Schedule C, Grade 8, commencing in the range of £501 to £639, ultimately rising to £694.

Higher National Certificate in electrical engineering is required, together with a recognised technical training, including experience in the design and installation of electrical equipment for power stations or industrial works.

Application forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by April 11, 1953. (D 259)

BRITISH ELECTRICITY AUTHORITY

South Western Division

ASSISTANT SHIFT CHARGE ENGINEER required at Newton Abbot Generating Station.

Superannuation scheme. Salary, N.J.B. Class "F," Grade 9, £607-£629.

Candidates should have had sound technical training and practical operating experience in a generating station.

Application forms obtainable from the Divisional Secretary, 26 Oakfield Road, Bristol, 8, to be returned not later than April 11, 1953. (D 271)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

Littlebrook Power Station (480 MW)
ASSISTANT ENGINEER (HANDLING)

APPLICANTS, who should possess a knowledge of shipping, coal storage and its associated problems, will be responsible for the operation of the coal and ash handling plant and associated equipment, including mobile equipment. Experience in the control of labour essential. Class "M", Grade 9, £906 3s. per annum.

Croydon "A" Power Station.
ASSISTANT MAINTENANCE ENGINEER ELECTRICAL

Applicants should preferably possess Higher National Certificate and should have had experience in the maintenance of alternators, e.h.t. switchgear and motors and all electrical and auxiliary plant. Experience in the control of labour an advantage. Class "F", Grade 9, £637 7s. per annum.

N.J.B. conditions of service for both positions. Salaries quoted include London Allowance.

Applications, giving details of education, present position and experience, should be addressed to the Station Superintendent at either Littlebrook Power Station, nr. Dartford, Kent, or Croydon "B" Power Station, Beddington Farm Road, Purley Way, Croydon, Surrey, to arrive not later than April 6. (D 236)

METROPOLITAN WATER BOARD

THE METROPOLITAN WATER BOARD have vacancies for TWO DRAUGHTSMEN on the permanent pensionable staff. Salary scale £545 by £22 to £611 per annum. Selected candidates will be appointed at commencing salaries having regard to their age, qualifications and experience. Maximum age 45 years. Applicants should possess either a Higher National Certificate, a General School Certificate or equivalent.

Applicants for one vacancy must have had experience in electrical wiring diagrams, and for the other, experience in welding design would be an advantage.

Applications, stating age and giving full details of qualifications and experience, should be addressed to the Chief Engineer at the offices of the Board, to arrive not later than April 10, 1953.

Canvassing disqualifies, and relationship to any member, officer or employee must be disclosed.

W. S. CHEVALIER,
Clerk of the Board.

Offices of the Board,
New River Head,
Rosebery Avenue,
London E.C.1. (D 232)

WANDLE VALLEY JOINT SEWERAGE BOARD

ELECTRICIAN/FITTER

ELECTRICIAN/FITTER required for maintenance work at the Board's Disposal Works, Byegrove Road, Merton, S.W.19, at a wage of £8 16s. per week plus 14s. per week for additional responsibilities. Working conditions will be those of the Joint Negotiating Committee for Local Authorities' Services (Building and Civil Engineering Craftsmen). Applicants should be experienced in power work and be competent to carry out electrical maintenance and repairs on automatic switchgear, starters and motors up to 50 h.p. Subject to satisfactory service, the post will become superannuable after twelve months. Applications should state age, present position and wages, details of apprenticeship and experience, and should be forwarded to the Surveyor to the Board, Town Hall, Mitcham, not later than April 11, 1953.

March 20 1953. (D 274)

NORTH EASTERN ELECTRICITY BOARD

Harrogate Sub-Area

APPLICATIONS are invited for the appointment of SECOND ASSISTANT DISTRICT ENGINEER at Thirsk. Applicants should have had experience in operation and maintenance of h.v. and l.v. systems. Experience in overhead line constructions work is also desirable. Salary, Schedule "A," Class "C," Grade 7, £599 to £622. N.J.B. conditions of service.

Applications, stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne, within ten days of the appearance of this advertisement. (D 233)

SOUTH EAST ESSEX TECHNICAL COLLEGE

LONGBRIDGE ROAD, DAGENHAM

REQUIRED, in September, an ASSISTANT (Grade "B") in Electrical Engineering. Candidates should have a degree or equivalent qualification and some industrial experience and will be required to teach to Higher National Certificate standard.

Salary, £490 by £25 to £765, plus London Allowance £36 to £561. Increments for approved industrial and teaching experience and war service; additions for training and graduate qualifications. Further particulars obtainable from the Clerk to the Governors at the College (stamped addressed foolscap envelope). (D 275)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Glasgow Sub-Area

APPOINTMENT OF SENIOR ASSISTANT ENGINEERS

(a) Planning and Development
(b) Meter, Test and Protection

APPLICATIONS are invited for the posts of Senior Assistant Engineers, as shown above, on the staff of the Glasgow Sub-Area.

Preference will be given to candidates holding Corporate Membership of the Institution of Electrical Engineers or equivalent qualification.

The conditions of employment will be those of the Agreement of the National Joint Board for the Electricity Supply Industry and the salary for the posts will be in accordance with the schedules to that agreement, viz.: Class "K," Grade 4, £1,093-£1,141 per annum, with the possibility that the classification of the sub-area will be raised to "L" in the near future. The appointments will be superannuable under the British Electricity Authority and Area Boards Superannuation Scheme.

The successful candidates will be required to reside within reasonable distance of the Sub-Area Headquarters.

Applicants for (a) should have wide experience in the design and layout of large underground distribution systems at pressures up to and including 33 kV in a densely loaded industrial and residential area. A knowledge of the principles of modern protective equipment and their application is necessary. Experience in the calculation of fault levels, the preparation of load flow diagrams, load research and sub-station design is also essential.

Applicants for (b) should have wide experience in metering practice, testing and repairs; testing of distribution equipment and fault location; modern protective systems; communications, supervisory and remote control systems.

Applications should be made on the official form which may be obtained from the undersigned and which should be completed and returned not later than April 16, 1953.

A. KELSO,
Manager.

75 Waterloo Street,
Glasgow, C.2. (D 273)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

SECOND ASSISTANT ENGINEER
Steam Plant Testing

APPLICATIONS are invited for the position of Second Assistant Engineer—Steam Plant Testing.

The appointee will be responsible for the supervision of acceptance tests and routine testing of all boiler and turbo plant within the Division. Particular consideration will be given to applicants who have had practical experience in modern generating stations or with manufacturers on the operation, construction and testing of steam plant.

With regard to technical qualifications, applicants should preferably be Corporate Members of the Institution of Electrical Engineers or the Institution of Mechanical Engineers, or have similar attainments. A sound knowledge of thermo-dynamics, steam plant testing instruments and calibration of such is essential.

The salary will be in accordance with Grade 2, Class "AX/CX" of Schedule "C" of the N.J.B. Agreement—£834 to £1,025 per annum.

Applications on Form AE6 which may be obtained from the above address or from any Divisional Office of the Authority, should be forwarded to 168 Broomhill Drive, Glasgow W.1, before April 1, 1953.

A. CHRISTIANSON,
Divisional Secretary.

March 11, 1953. (D 220)

NATIONAL COAL BOARD

APPLICATIONS are invited for the following post in the Architects' Department at Denaby Main, Nr. Doncaster.

ELECTRICAL ENGINEERING ASSISTANT

Candidates should hold the Higher National Certificate for Electrical Engineering or equal qualifications, and be able to prepare layouts, specifications and approximate estimates for lighting and power circuits, switchgear and transformers for industrial buildings, and should be competent to supervise electrical contracts for such work. Salary with a minimum of £525 per annum, will be in accordance with qualifications and experience.

Applications for the above appointment should be made to: S. W. Squire, National Coal Board, Architects' Dept., The Mining Offices, Denaby Main, Nr. Doncaster. (D 263)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

CIVIL ENGINEERING DRAUGHTSMEN
Construction Department, North Wilford
Vacancy No. 22/53

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction, drainage and sanitation schemes, associated with offices and administrative buildings.

The salary will be in accordance with Grade 5 (£567-£671 per annum) or Grade 6 (£433-£567 per annum) of Schedule "D" of the National Joint Board Agreement.

ASSISTANT SHIFT CHARGE ENGINEER
Northampton Power Station
Vacancy No. 35/53

Applicant should possess the Higher National Certificate, or its equivalent, and have had experience in a responsible position in a modern power station.

The salary will be in accordance with Class "G," Grade 9 (£641-£667 per annum) of the National Joint Board Agreement.

JUNIOR ENGINEER (CONTROL ROOM)
Leicester Power Station
Vacancy No. 37/53

Applications are invited for the appointment of Junior Engineer (Control Room) at Leicester Power Station. Candidates should possess or be taking a course of study leading to technical qualifications. Previous experience an advantage.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, Class "H," Grade 14 (£499-£516 per annum).

Closing date for the two latter appointments will be April 1, 1953.

POWER STATION SUPERINTENDENT
Chesterfield Generating Station
Vacancy No. 40.53

Candidates should have experience in the operation, maintenance and administration of an Electricity Generating Station and be the possessor of appropriate technical qualifications.

The terms and conditions of service will be those approved by the National Joint Board and the salary paid will be in accordance with Class "B," Grade 1 (£876-£920 per annum) of the National Joint Board Agreement.

Closing date for this appointment will be April 9, 1953.

The above appointments will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications are to be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller
(D 269)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

REQUIRED, a STATION CHEMIST at Neepsend Power Station, Sheffield.

Applications should hold a minimum qualification of Higher National Certificate in Chemistry, or its equivalent, and have experience in power station practice.

Salary £772 to £802 per annum, Class "H," Grade 7, N.J.B. Agreement, Superannuation Scheme.

Application forms obtainable from Divisional Secretary (Establishments), British Electricity Authority, British Electricity House, St. Mary's Road, Leeds 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
(D 276)

SOUTH EAST ESSEX TECHNICAL COLLEGE AND SCHOOL OF ART

LONGBRIDGE ROAD, DAGENHAM

Principal: F. Heathcoat, M.Sc., Ph.D., F.R.I.C., F.I.M.

APPLICATIONS invited for post of HEAD OF ENGINEERING DEPARTMENT (Burnham Report, Grade III).

Salary: £1,190 by £25 to £1,340 (man), plus £36 or £48 London allowance.

Applicants should possess a good engineering degree and have had suitable industrial, teaching, and administrative experience. Further particulars and application form obtainable from the Chief Education Officer, County Offices, Chelmsford (stamped addressed foolscap envelope) and returnable by April 7. (D 209)

BRITISH ELECTRICITY AUTHORITY

South Western Division

ENGINEERING DRAUGHTSMAN required in the Transmission Department, Divisional Headquarters, Bristol.

Superannuation Scheme. Salary, N.J.B. Schedule "D" Grade 6, £433-£567.

Some experience of h.v. switchgear (layout and diagrams) and associated equipment is essential.

Application forms obtainable from the Divisional Secretary, 26 Oakfield Road, Bristol, 8, to be returned not later than April 7, 1953.

March 13, 1953. (D 210)

MERZ AND McLELLAN

HEAD OF INVESTIGATION AND STEAM TESTS DEPARTMENT

THE above position of head of the Investigation and Steam Tests Department is vacant due to the present occupant being appointed Chief Mechanical Engineer of the firm.

The department, which is in Newcastle, is responsible for general investigations occurring in the course of the mechanical design of large power stations in this country and overseas, and for the performance of acceptance tests on completed boilers, turbines and other major plant (excluding works inspection).

Applications will be considered from engineers with the following qualifications:—

(a) First or good second-class degree in Mechanical Sciences or Engineering.
(b) Corporate membership of the Institution of Mechanical Engineers (or the Institution of Electrical Engineers).
(c) Experience in the design of steam power stations or in the design, testing or operation of power station plant.

The salary offered will be fully commensurate with the qualifications of the applicant.

Applications giving full details of the applicant's experience and present salary should be sent to Merz and McLellan, Carliol House, Newcastle-upon-Tyne 1. (D 216)

A CABLE COMPANY, London area, require (1) SENIOR CHEMIST with University degree or equivalent qualifications and experience in the design of rubber and P.V.C. compounds and the manufacture of a wide range of rubber and plastic cables. Salary up to £1,000 according to qualifications and experience. (2) JUNIOR CHEMIST with University degree, or other qualifications and experience in the cable, rubber or plastic industries. Salary up to £900.—Apply Box No. 2527, Electrical Times. (D 261)

A FOREMAN ARMATURE-WINDER with repair shop experience of a.c. and d.c. also f.h.p., for small but expanding firm. Excellent opportunity for man with initiative, not over 40.—Box No. 2529, Electrical Times. (D 262)

AN EXPERIENCED CHARGE ENGINEER (shift duties), age over 30 years, is now required for permanent position in an industrial steam power plant in London area. Commencing salary £800 to £900 according to qualifications. Post is pensionable.—Reply Box No. 2521, Electrical Times, quoting reference SCE/2. (D 249)

APPLICATIONS are invited for the post of ASSISTANT to the Works Engineer. Must have served a recognised apprenticeship. Higher National Certificate or equivalent essential. Duties chiefly mechanical maintenance. Should be capable of deputising for the Works Engineer in co-ordinating mechanical, electrical and building maintenance work.—Apply, Personnel Director, Ferguson Bros. Ltd., Holme Head Works, Carlisle. (D 277)

ARC AND GAS WELDER required. Must be first-class man with experience non-ferrous metals and brazing. Some experience of copper working and ability to undertake light constructional work an advantage. Good wages, working conditions and canteen facilities.—Apply: Personnel Dept., Garringtons, Ltd., Bromsgrove. (D 243)

ASSISTANT CORROSION ENGINEER required by Kuwait Oil Company for service in Kuwait. Should possess a degree in electrical or chemical engineering or metallurgy, but Higher National Certificate in any of these subjects plus a full recognised engineering apprenticeship would be acceptable. Experience in corrosion engineering an advantage but not essential as successful candidate will undergo some training in the U.K. Age 22-30. Overseas salary starting £790 p.a. clear, plus generous allowances, pension scheme and kit allowance. —Write for application form, giving personal details and quoting K.1676 to Box No. W/17, c/o 191, Gresham House, E.C.2. (D 223)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

JOHNSON & PHILLIPS, LIMITED
CHARLTON, S.E.7

MANAGER OF SWITCHGEAR DEPARTMENT

APPLICATIONS are invited from well qualified Engineers with considerable experience in the switchgear industry for the appointment of Manager, Switchgear Department.

The successful applicant will be required to take full responsibility for design, development, production and the commercial conduct of this increasingly important section of the Company's activities. He will also be required to exercise overall technical control of the activities of the Company's switchgear factories overseas.

Applications, which will be treated in strict confidence, should be addressed to:—

The Manag'ng Director,
JOHNSON & PHILLIPS, LIMITED,
CHARLTON, LONDON, S.E.7. (D 289p)

ASSISTANT ELECTRICAL ENGINEER required, age 21-25 years. Applicants must have served a work's apprenticeship, H.N.C. standard preferred. Experience required in the preparation of specifications, estimating of motors, control gear and allied equipment, and capable of acting in a technical advisory capacity.—Applications must be made in writing to the Sturtevant Engineering Co. Ltd., Southern House, Cannon Street, London E.C.4, and marked for the attention of Reference G.19, stating full particulars of education, age, experience and salary required. (D 253)

BRITISH ELECTRICITY AUTHORITY require AGRICULTURAL ASSISTANT in the Agricultural Electrification Section of the Commercial Department based at London Headquarters.

Candidates should have good knowledge and practical experience of general agriculture with particular interest in farm mechanisation, dairy equipment, crop drying, etc. Electrical experience not essential, but candidates must be interested in farm electrification and be prepared to develop this interest. Preference will be given to a graduate in agriculture. An electrical graduate with sound agricultural experience would be considered; special preference being given to holder of National Diploma in Agricultural Engineering. Personality is important as appointment will involve public speaking.

Salary N.J.C. Grade 6, £735 to £814 inclusive. Pension scheme. Applications stating age, experience, present post and salary to D. Moffat, Director of Establishments, British Electricity Authority, Winsley Street, W.1, by April 10, 1953. Quote reference AE 351. (D 252)

BRITISH ELECTRICITY AUTHORITY require PUBLICATIONS ASSISTANT in Welfare Department in London. Duties cover editorial layout of publications dealing with training, safety, health, welfare and joint consultation. Experience of working with printers, publishers and knowledge of documentary films desirable. Salary N.J.C., Grade 4, £610-£672 inclusive. Pension scheme.—Applications, stating age, experience, present post and salary to D. Moffat, Director of Establishments, British Electricity Authority, Winsley Street, W.1, by April 13, 1953. Quote reference AE.353. (D 287)

BRITISH ELECTRICITY AUTHORITY, Specifications and Contracts Branch, Generation Construction Sub-Department, require a SECOND ASSISTANT ENGINEER (MECHANICAL) at London Headquarters with a knowledge of all aspects of specifications and contracts work in connection with mechanical equipment for power stations and qualified to deal with the analysis of tenders and the preparation of recommendations for the placing of contracts. Candidates should be Associate Members of the I.Mech.E., or hold equivalent qualifications. Salary N.J.B., Grade 3, £840-£1209 inclusive.

Applications, stating age, present salary and giving full details of qualifications and experience, should be forwarded to D. Moffat, Director of Establishments, Winsley Street, London, W.1, not later than April 13, 1953. Quote reference AE/352. (D 278)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

CABLE SALES ESTIMATOR for South Africa required with knowledge of paper, rubber, P.V.C. cable estimating. Passage paid to South Africa. Salary £(SA)900 plus cost of living.—Write, stating age, experience, etc., to Box No. 2519, Electrical Times. (D 248)

CAMEROONS DEVELOPMENT CORPORATION require for service in British Cameroons (West Africa) an ELECTRICAL SUPERVISOR. Candidates should have served an indentured apprenticeship in the electrical trade, and have had general electrical experience of installing operating and maintaining power plants as well as local distribution street lighting and house wiring. A knowledge of line and radio telephones is desirable. Candidates should also have attained foreman status. Age limits 25-35, although an older man might be considered for the appointment. Commencing salary according to ability and experience in scale £775 to £1,175. Tours 18-24 months, with generous leave on full pay. Outfit allowance £80. Provident fund contributions, 10 per cent. employee, 15 per cent. corporation. First-class passages are provided, together with free quarters equipped with heavy furniture.

Applications in writing, giving full particulars, to Rubber and Mining Agencies, Ltd., 52 Leadenhall Street, London E.C.3. Only applications from candidates selected for further consideration will be acknowledged. This post is exempt from the requirements of the Notification of Vacancies Order, 1952. (D 251)

COPPERSMITH for interesting electrical construction work in development engineering department. Experience required of tube working and copper fabrication, first-class experience of brazing essential. Good wages, working conditions and canteen facilities.—Apply: Personnel Dept., Garringtons, Ltd., Bromsgrove. (D 242)

DESIGNER-ESTIMATOR required, experienced electro magnetic equipment and mechanical handling.—Reply stating experience, salary, age, etc. Rev Motors Ltd., Beehive Works, Birchills, Walsall. (D 237)

DESIGNER who has had experience with the actual design and manufacture of contactors, required by old-established firm of switchgear manufacturers. He must be capable of taking charge of a progressive new development on own initiative, in North West.—Box No. 2475, Electrical Times. (D 136)

DRAUGHTSMAN required by Scottish firm, experienced in sagging overhead lines.—Reply, stating age, experience and salary required, to Box No. 2517, Electrical Times. (D 247)

DRAUGHTSMEN. The English Electric Company, Limited, have vacancies at the Liverpool works for Electro/Mechanical Draughtsmen for interesting work on a wide variety of new projects. The essential requirements are previous experience as a draughtsman, on the design and detail of any kind of electro-mechanical equipment, mechanisms, or welded fabrications for batch production. Modern houses are available for selected applicants and travelling expenses for interviews will be paid.—Write, giving full details of age, qualifications and experience, to Central Personnel Services, Marconi House, 336-7 Strand, London, W.C.2, quoting ref 1099. (D 53)

DRAUGHTSMEN required for low tension small switch and fuse gear.—Write, giving age, details of experience and salary expected, to the Personnel Officer, W. T. Henley's Telegraph Works Co., Ltd., Gravesend, Kent. (D 193)

PRESSED STEEL COMPANY LIMITED
REFRIGERATION DIVISION

Applications are invited for the post of Lady Housecraft Adviser and Demonstrator. Candidates must possess a Domestic Science Certificate and E.A.W. Diploma, and be prepared to travel extensively throughout the country.

Duties will include demonstrating the Company's products in Dealers' Showrooms and at National Exhibitions, lecturing on cold cookery and home freezing of foodstuffs, liaison with Women's Organisations and assisting in sales promotional activities generally.

Salary will be in accordance with training and experience, plus expenses. Superannuation Scheme available.

Applications, giving age, full details of experience and qualifications and salary expected, should be addressed to:—

HOME SALES MANAGER,
PRESSED STEEL COMPANY LIMITED,
Refrigeration Division,
COWLEY, OXFORD (D 194p)

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A LARGE Cable Manufacturing and Contracting Company requires the following staff for permanent service in South Africa and Australia:—

(a) Contract Engineer to take full charge of cable installation contracts.

(b) Assistant Contract Engineers for supervising cable installation contracts.

(c) Jointing Engineers to take charge of super-tension cable jointing and to train jointers.

(d) Super-tension cable Jointers.

Employment will be mainly on contracts for the laying and jointing of super-tension cables of all types. Suitable applicants would undergo a period of training and probation in the United Kingdom, and confirmation of appointments abroad would follow the satisfactory completion of this period. The situations would be permanent and salary would be according to qualifications and experience.

Previous knowledge of super-tension cable contract work, particularly on oil-filled cables, would be a considerable advantage.

Apply, stating age, qualifications and experience, to **Box No. 2523, Electrical Times.** (D 250p)

ELECTRICAL DRAUGHTSMAN required for large paper mill by Bowater's Thames Paper Mills, Ltd., at Northfleet, Gravesend, Kent. Must be experienced in layout of power installations, wiring diagrams and switchgear. Some mechanical experience an advantage.—Please state age, experience and qualifications. (D 150)

ELECTRICAL ENGINEER. Old-established medium/heavy engineering company require qualified Electrical Engineer capable of drawing up electrical specifications for company's products, including wiring diagrams and supervising wiremen on the shop floor.—Box No. 2511, Electrical Times. (D 240)

ELECTRICAL MECHANICS required for h.f. heating equipment construction and maintenance. Must be first-class men with sound machine shop and bench fitting apprenticeship.—Apply: Personnel Dept., Garringtons, Ltd., Bromsgrove, Worcs. (D 244)

ENGINEERS with initiative required for team making detailed study and preparing scheme for planned development of large integrated works producing pig iron and chemical products. Honours University Degree desirable and/or membership of professional institutions. Wide practical experience of works' layout and techniques essential. Some administrative experience desirable. Location London, but work will involve travelling. Salaries according to experience, age and qualifications.

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IMPERIAL CHEMICAL INDUSTRIES, LIMITED, General Chemicals Division, invite applications for the position of ASSISTANT SHIFT CHARGE ENGINEER in the Company's Power Department for duty in their Weston Point Power Station, Runcorn, which has an installed capacity of 100 MW. Applicants, who should be between the ages of 25 and 30 years, should have had a sound practical training in mechanical engineering, hold the Higher National Certificate in Mechanical Engineering or equivalent qualification and should have had some experience of the operation of large modern water tube boilers, turbo-alternators and ancillary plant. The commencing salary will not be less than the up-to-date figure payable under the N.J.B. Schedule "A" for Class "G," Grade 9, while the maximum salary will be considerably higher than that for the same class and grade. The selected candidate will be required to pass a medical examination and to join the Company's Pension Fund. —Applications in writing, giving age and full particulars of education, technical qualifications, engineering training and power station experience, should be sent to the Staff Manager, Imperial Chemical Industries, Limited, General Chemicals Division, Cunard Building, Liverpool, 3, quoting reference P/5. (D 115)

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REPRESENTATIVES for selected territories required by well-known manufacturers of cables, cords and harnesses. Applicants must have personal connection with manufacturers of domestic and industrial appliances, telecommunications apparatus, etc.—Write full details, which will be treated in strict confidence, to Box No. 2513, Electrical Times. (D 245)

SALES REPRESENTATIVES of proved ability required by switchgear manufacturers for Glasgow, Leeds and Cheshire. Car owners preferred.—State age, experience and all details to Box No. 2509, Electrical Times. (D 239)

SENIOR DESIGN ENGINEER required by well-known manufacturers of Rotating Dynamo Electric Machinery. This is a senior Staff Position, and salary will be commensurate with the candidate's qualifications and experience, and will be not less than £900 per annum, as well as staff superannuation.—Reply to Box B.1149, W. H. Smith and Son, Ltd., Manchester 3. (D 179)

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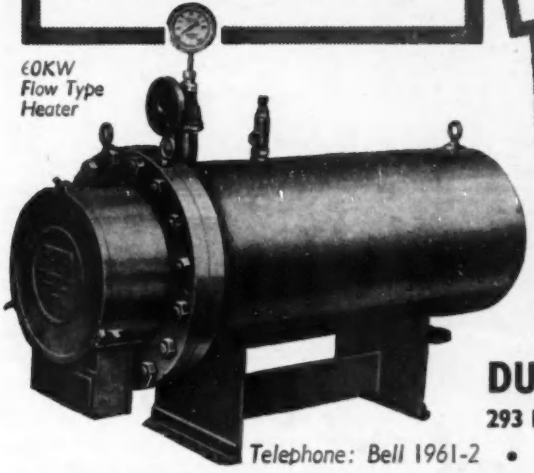

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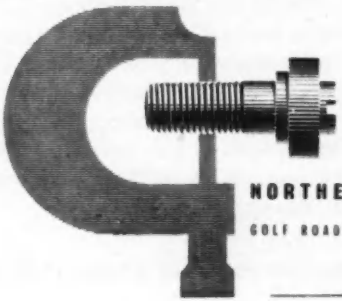

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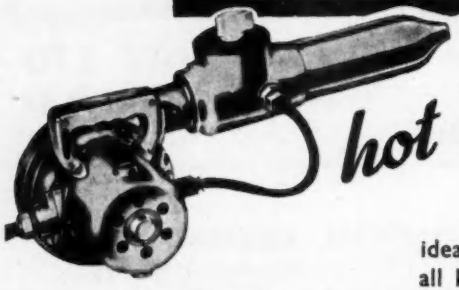

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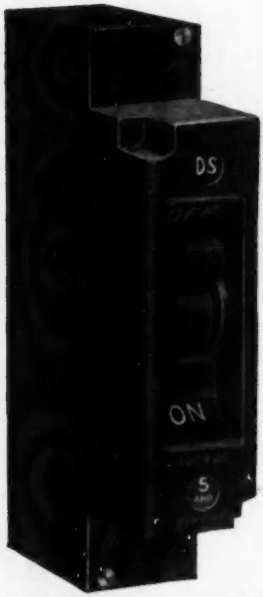

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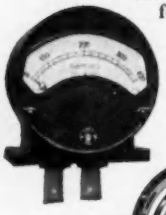

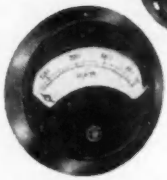

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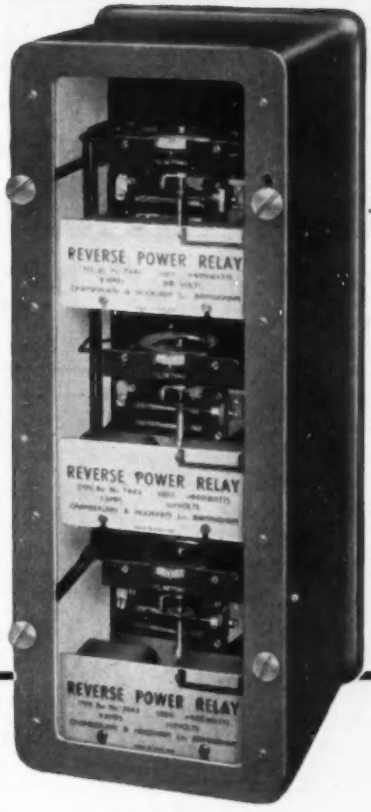

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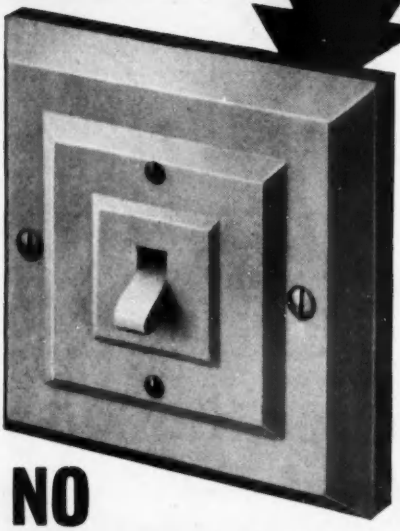

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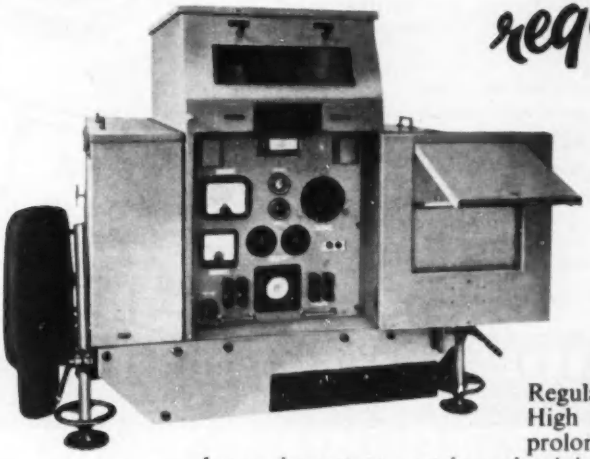

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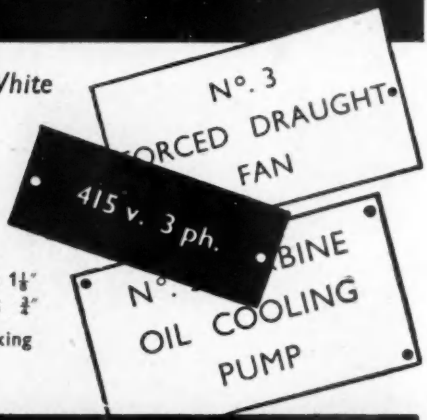

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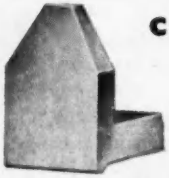

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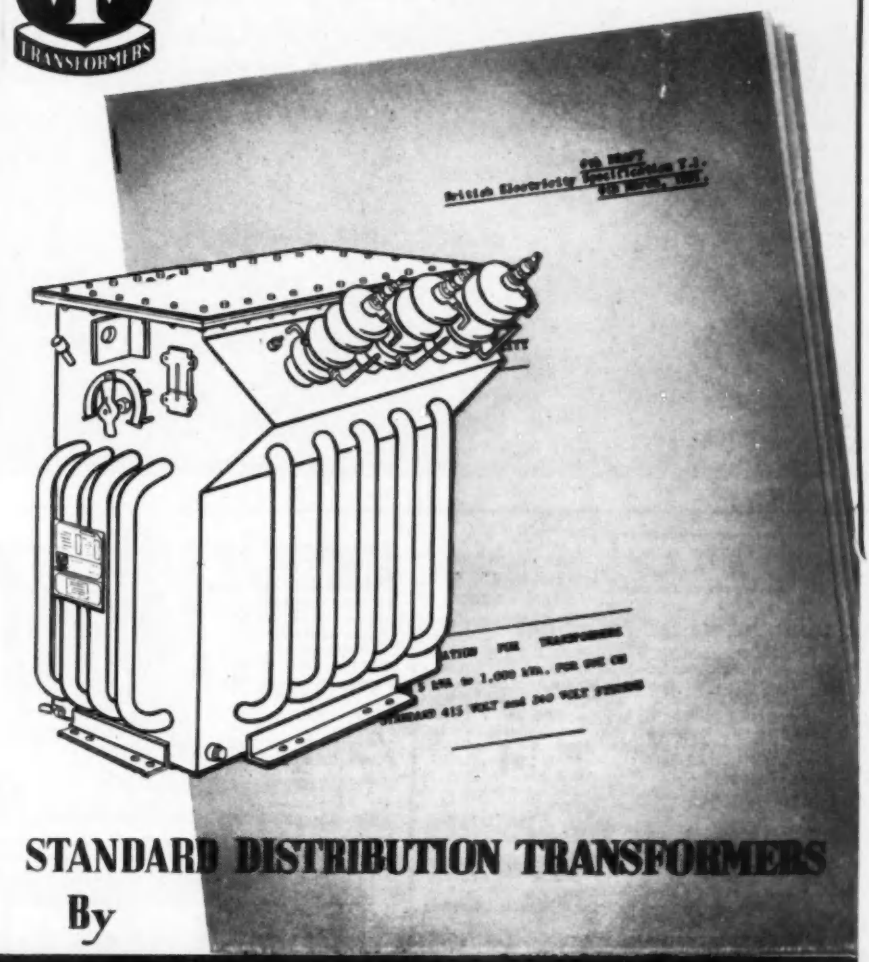

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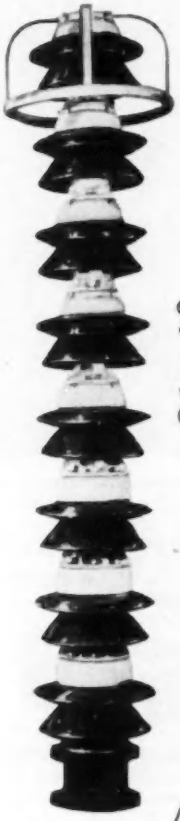

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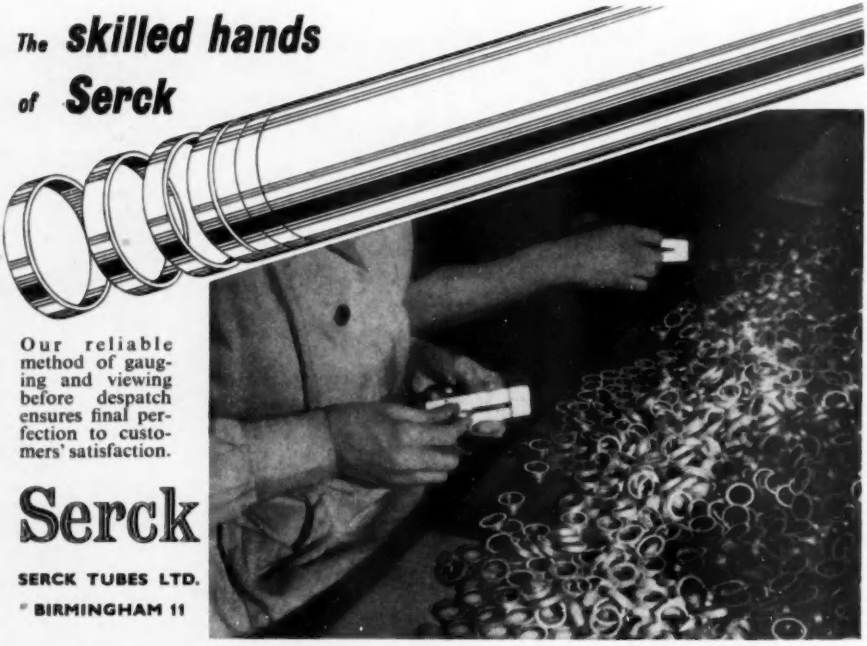

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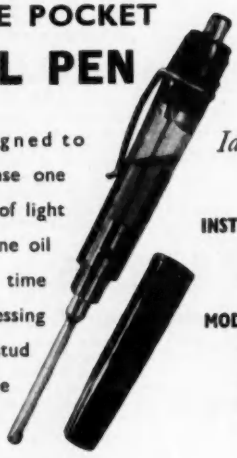

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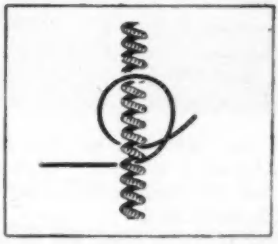
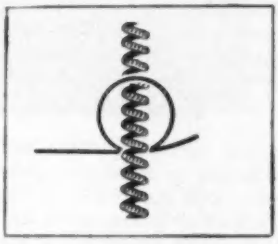


The open loop support of the old method allows several turns of the filament to be short-circuited when the lamp is cap down, thus over-running the filament and shortening its life.



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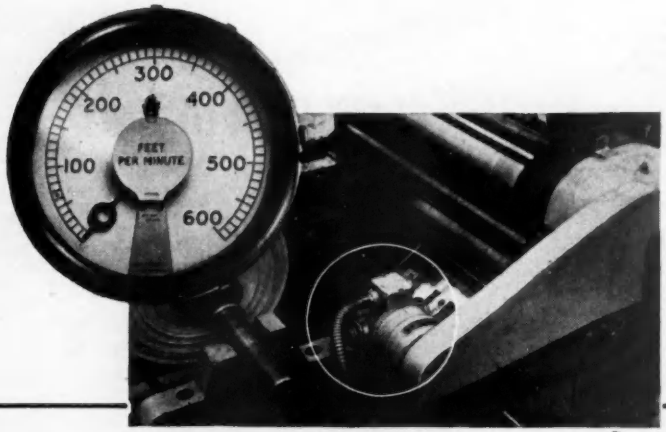

PRINTING SPEEDS REMOTELY INDICATED

In the Printing Department of Mars Ltd., Slough, an Evershed electrical Tachometer fitted on a Photogravure Printing Press gives remote indication of running speeds.

The indicator, scaled in feet per minute, shows the amount of wrapping paper passing through the press, and enables the operator to ensure that the speed is correct for the particular type of paper being printed. The Company also uses an Evershed Tachometer on their main production belt to ensure that speeds are maintained and production is kept at a constant level.

The Evershed Electrical Tachometer is an apparatus for indicating and recording, at a distance, speeds and other proportionate quantities such as rate of production. A full description of the apparatus and its working is given in Publication J.224.

EVERSHED TACHOMETER AIDS MOTOR CAR OUTPUT

The Rover Car Company, whose works at Solihull are playing so important a part in the export drive of high quality British cars, use Evershed Tachometer equipment to aid in the centralised control of production so essential in a full-out effort.

An Evershed Tachometer transmitter is coupled to the driving motor of a King Conveyor. From this motor a shaft running beneath the floor drives four production lines — Body and Paint, Trim Finish, Chassis and Mount, and final inspection and polish — which are spread in parallel across the really vast shop. The transmitter is linked to an Evershed Tachometer Indicator in the centrally placed Production Manager's Office, and to an Evershed Tachometer Recorder in the Chief Planning Office.

The Indicator serves as a "permanently visible check" on the four production lines mentioned, while the Recorder supplies the Company's planners with a permanent always-at-hand record of this information. The Indicator is particularly useful at present in showing power load shedding which causes the driving motor speed to fall, as a fall "cars per hour" reading: so that steps can be taken at once to bring the motor up to normal speed again.

EVERSHED

EVERSHED & VIGNOLES LIMITED

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A Contemporary

POWER STATION

Installation

Unit Type Switchboards, equipped with Aeroflex high breaking capacity rewireable cartridge fuses installed in the distribution board annexe of Walsall Generating Station. Photograph by courtesy of the British Electricity Authority.

Aeroflex

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